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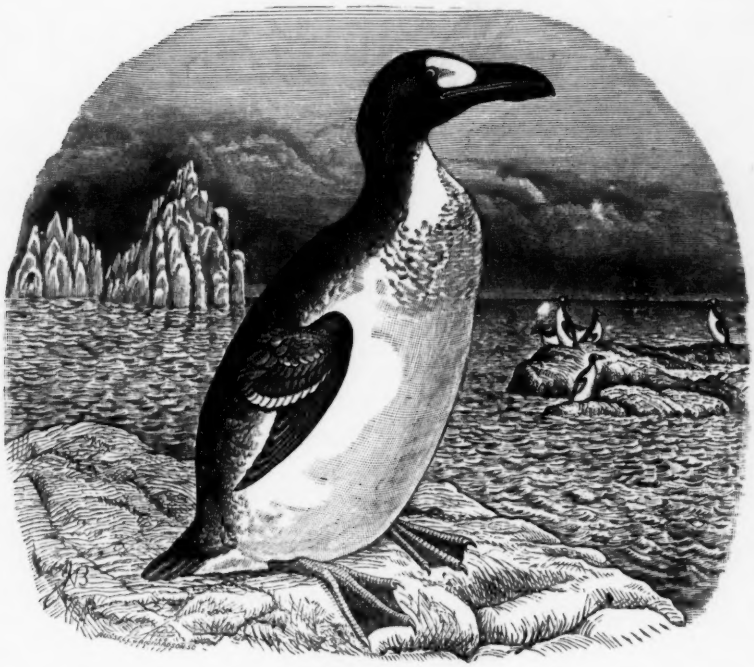

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BAILY, CHAS. E., Winchendon, Mass.....1890
BAILY, WM. L., 138 South 4th St., Philadelphia, Pa.....1885
BANGS, E. A., 31 Pemberton Sq., Boston, Mass.....1884
BANGS, OUTRAM, 31 Pemberton Sq., Boston, Mass.....1884
BANKS, J. W., St. John, N. B.....1887
BARNARD, JOB, 500 5th St., N. W., Washington, D. C.....1886
BARNES, Hon. R. M., Lacon, Ill.....1889
BARNEY, EVERETT H., Springfield, Mass.....1891
BARRE, WILL DE LA, 1301 7th St., Minneapolis, Minn.....1891
BEAL, F. E. L., Lunenburg, Mass.....1887
BEARD, DANIEL C., 110 Fifth Ave., New York City.....1887
BELL, JAMES P. H., Gainesville, Fla.....1889
BELLOWS, ED. D., 215½ 4th St., Jersey City, N. J.....1889
BENNER, FRANKLIN, 315 3d Ave., South Minneapolis, Minn.....1883
BENNERS, GEO. B., 2048 Arch St., Philadelphia, Pa.....1889
BENSON, Lieut. H. C., U. S. A., West Point, N. Y.....1886
BENT, ARTHUR C., Taunton, Mass.....1889
BERGTOLD, Dr. W. H., 56 Allen St., Buffalo, N. Y.....1889
BERIER, DELAGNEL, Bay Ridge, Kings Co., N. Y.....1885
BILL, CHARLES, Springfield, Mass.....1889
BISHOP, Dr. LOUIS B., Box 235, New Haven, Conn.....1885
BOARDMAN, G. A., Calais, Maine.....1883
BOGERT, M. T., Flushing, Queens Co., N. Y.....1889
BOIES, A. H., Hudson, Mich.....1890
BOLLES, F., Harvard College, Cambridge, Mass.....1889

Bond, Frank, Cheyenne, Wyoming..... 1887
Bond, Harry L., Sioux City, Iowa.....1890
Bowdish, B. S., Tallapoosa, Ga.....1890
Bowles, J. H., Ponkapog, Mass.....1891
Bradford, L. M. B., Providence, R. I.....1889
Brandreth, Franklin, Sing Sing, N. Y.....1889
Brimley, C. S., Raleigh, N. C.....1888
Brockunier, Saml. H., Wheeling, West Virginia.....1889
Brown, Edward J., 820 20th St. N. W., Washington, D. C.....1891
Brown, Herbert, Tucson, Arizona.....1885
Brown, Hubert H., 22 Collier St., Toronto, Ontario 1889
Brown, John Clifford, 85 Vaughan St., Portland, Maine.....1888
Browne, Frank C., Framingham, Mass.....1883
Bulley, Reginald H., Canton, Ohio.....1889
Burns, Frank L. Berwyn, Chester Co., Pa.....1891
Butler, Amos W., Brookville, Ind.....1885
Cairns, John S., Weaverville, N. C.....1889
Campbell, Harvey C., Lansingburg, Rens. Co., N. Y 1890
Cantwell, George G., Colorado Springs, Col.....1889
Carr, Chas. F., 126 State St., Madison, Wis.....1890
Carruth, C. T., 119 Milk St., Boston, Mass.....1891
Caulk, Wm. B., Terre Haute, Ind..... 1891
Chamberlain, C. W., 51 Lincoln St., Boston, Mass.....1885
Churchill, Geo. B., 47 Wellington St., Worcester, Mass.....1890
Clark, Hubert L., Amherst, Mass..... 1886
Clark, J. N., Saybrook, Conn.....1885
Clarke, Prof. S. F., Williamstown, Mass.....1890
Clute, Willard N., 11 Jarvis St., Binghamton, N. Y.....1889
Coale, H. K., 131 Wabash Ave., Chicago, Ill.....1883
Colburn, A. E., 738 Broadway, New York City.....1891
Colburn, W. W., Springfield, Mass.....1889
Coleman, Geo. A., Lincoln, Neb.....1888
Collins, Capt. J. W., Smiths. Inst., Washington, D. C.....1888
Comeau, Nap. A., Godbout, P. Q.....1885
Conklin, Dr. Wm. A., Director of Menagerie, Central Park, New York City.....1885
Cook, Prof. Chas. B., Agricultural College P. O., Ingham Co., Mich. 1890
Coombs, Frank E., Patterson, La.....1890
Cope, Alban, Germantown, Pa.....1885
Copeland, A. M., Springfield, Mass.....1889
Corning, Erastus, Jr., Albany, N. Y. 1891
Coues, Elliott Baird, care of Dr. E. Coues, Smiths. Inst., Washton, D. C.....1886
Coues, Wm. Pearce, 14 Ash St., Cambridge, Mass.....1888
Cox, Philip, Newcastle, New Brunswick.....1887
Crampton, H. E., Jr., 256 W. 121st St., New York City 1891
Crandall, C. W., Woodside, Queen's Co., N. Y. 1891

CULYER, Col. JOHN Y., Room 150, Potter Building, New York City.1890
DAENZER, CARL, 13 North 3d St., St. Louis, Mo.....1888
DAGGETT, FRANK S., Duluth, Minn.....1889
DANA, ROY, Warren, Ohio.....1889
DAVIS, F. J., 4 Noyes St., Utica, N. Y.....1890
DAVIS, GEO. A., Mexico, N. Y.....1890
DAVISON, J. L., Lockport, Niagara Co., N. Y.....1885
DELAFIELD, JOSEPH L., 475 5th Ave., New York City.....1888
DENNE, DAVID, 104 St. Francois St., Montreal.....1890
DETWILLER, Dr. JNO. W., Bethlehem, Pa.....1891
DICKINSON, EDWIN, Springfield, Mass.....1885
DICKINSON, W. S., Tarpon Springs, Fla. 1891
DIXON, FREDK. J., Hackensack, N. J. 1891
DOUGHERTY, CAPT. W. E., U. S. A., Angel Island, Cala. 1890
DOUGLASS, BERT H., Burlington, Kansas 1890
DREW, FRANK M., Bloomington, Ind.....1885
DURFEE, OWEN, Box 125, Fall River, Mass. 1887
DUTCHER, BASIL HICKS, 525 Manhattan Ave., New York City..... 1886
DYCHE, Prof. L. L., Lawrence, Kansas.....1886
EAMES, Dr. EDWIN H., Bridgeport, Conn. 1888
EASTMAN, HARRY D., Framingham, Mass. 1891
EATON, ALVAH A., Dunlap, Cala.....1890
EDDY, N. A., 615 North Grant St., Bay City, Michigan.....1885
EDGAR, NEWBOLD, 28 E. 39th St., New York City 1891
EDSON, JOHN M., Sehome, Washington.....1886
ELDON, CHARLES H., Williamsport, Pa. 1891
EMERSON, W. OTTO, Haywards, Cala.....1885
EVANS, EVAN M., Englewood, N. J.....1888
EVANS, SAMUEL C., Jr., Riverside, Cala. 1889
EVERMANN, Prof. B. W., Terre Haute, Ind.....1883
FAIRBANKS, Hon. FRANKLIN, St. Johnsbury, Vt.....1885
FANNIN, JOHN, Provincial Museum, Victoria, B. C.....1888
FAXON, WALTER, Mus. Comp. Zoöl., Cambridge, Mass.....1891
FERNALD, ROBERT H., Orono, Me.....1890
FIGGINS, J. D., 429 P St., N. W., Washington, D. C.....1889
FISHER, DAVENPORT, Milwaukee, Wis. 1890
FISHER, WM. HUBBELL, 12 Wiggins Block, Cincinnati, Ohio.....1883
FLINT, H. W., Yale National Bank, New Haven, Conn.....1888
FLINT, WM. R., Madera, Fresno Co., Cala.....1890
FORBUSH, EDW. H., 424 Main St., Worcester, Mass..... 1887
FOX, Dr. WM. H., 1826 Jefferson Place, Washington, D. C.....1883
FUERTES, LOUIS AGASSIZ, Ithaca, N. Y.....1891
GALE, DENIS, Gold Hill, Boulder Co., Colorado.....1886
GAULT, B. T., Glen Ellyn, DuPage Co., Ill.....1885
GESNER, Rev. A. H., Sing Sing, N. Y.....1885
GIBSON, LANGDON, Flushing, N. Y. 1887
GILBERT, CARLETON, 1800 Wabash Ave., Chicago, Ill.....1889

GOODALE, JOSEPH L., 67 Sparks St., Cambridge, Mass.....1885
GORDON, THEODORE, Savannah, Ga. .....189[illegible]
GOSS, B. F., Pewaukee, Waukesha Co., Wis.....1883
GOULD, JOSEPH E., 281½ North High St., Columbus, Ohio.....1889
GRANGER, WALTER W., Am. Mus. Nat. Hist., New York City 1891
GRANT, JNO. B., 108 Duane St., New York City 1890
GRANT, U. S., 200 West 19th St., Minneapolis, Minn.....1885
GREEN, MORRIS M., 410 Graves St., Syracuse, N. Y.....1886
GREENE, I. C., Fitchburg, Mass. 1891
GREGG, Dr. WM. H., 143 West 21st St., New York City 1883
HAGERUP A., (Greenland), Viborg, Denmark.....1888
HALES, HENRY, Ridgewood, N. J.....1890
HANMER, C. C., Burnside, Conn.....1888
HARDY, MANLY, Brewer, Maine.....1883
HARTE, CHAS. R., Columbia College, New York City.....1890
HASBROUCK, EDWIN M., 1303 Corcoran St., Washington, D. C. 1887
HAUPT, LOUIS, 61 Liberty St., New York City.....1888
HAWLEY, A. H., Vineland, N. J.....1886
HAZARD, R. G., 2d, Peace Dale, R. I.....1885
HAZZARD, Dr. T. L. Allegheny, Pa. 1891
HEDGES, CHARLES F., New Haven, Conn.....1891
HEIMSTREET, Dr. T. B., 14 Division St., Troy, N. Y.....1888
HELME, ARTHUR H., Miller's Place, Suffolk Co., N. Y.....1888
HENDRICKSON, W. F., 860 Broadway, New York City 1885
HICKS, HENRY, Westbury Station, Queens Co., N. Y. 1888
HICKS, JOHN D., Old Westbury, Queens Co., N. Y.....1888
HINE, Mrs. JANE L., Sedan, Ind.....1890
HITCHCOCK, FRANK H., Dept. of Agriculture, Washington, D. C....1891
HOADLEY, Dr. FREDK. H., 9 W. 30th St., New York City 1891
HOLBROOK, Judge S. T., Norwich, Conn.....1885
HOLMAN, RALPH H., Worcester, Mass.....1890
HOOPES, JOSIAH, West Chester, Pa.....1889
HORNADAY, W. T., 42 Niagara St., Buffalo, N. Y. 1888
HOUGH, ROMEYN B., Lowville, N. Y.....1883
HOWELL, ARTHUR H., 212 Madison St., Brooklyn, N. Y.....1889
HOYLE, CHARLES E., West Millbury, Mass.....1889
HOYT, F. R., Grand Hotel, New York City.....1891
HOYT, WM. H., Stamford, Conn.....1888
HOWE, C. P., Waukesha, Wis. 1891
HUBBARD, Miss SARA A., 39 33rd St., Chicago, Ill. 1891
HUGHES, Dr. WM. E., 3726 Baring St., Philadelphia, Pa.....1891
HULL, WALTER B., Box 47, Milwaukee, Wis.....1889
HURD, THEO. D., Riverside, Cala.....1890
HURTER, JULIUS. 2346 South 10th St., St. Louis, Mo.....1888
HVOSLEF, Dr. J. C., Lanesboro, Minn.....1885
HYATT, Miss MARY, Stanfordville, N. Y.....1891
INGALLS, CHARLES E., East Templeton, Mass.....1885

INGERSOLL, ALBERT M., 816 5th St., San Diego, Cala.....1885
INGRAHAM, D. P., Elmira, N. Y.....1889
ISHAM, C. B., Am. Mus. Nat. Hist., New York City.....1891
JACKSON, THOS. H., West Chester, Pa.....1888
JACOBS, J. WARREN, Waynesburg, Pa.....1889
JAMES, HOWARD K., Rockville, Conn.....1888
JARDINE, CHAS. S., 318 East 39th St., New York City.....1888
JEFFRIES, WM. A., 78 Devonshire St., Boston, Mass.....1883
JENKS, Prof. J. W. P., 31 George St., Providence, R. I.....1888
JESURUN, Dr. MORTIMER, Douglas, Wyoming.....1890
JOHNSON, ALBERT I., Hull, Iowa.....1885
JOHNSON, FRANK E., Parkville, Kings Co., N. Y.....1888
JOHNSON, FRED. O., Oakland, Cala.....1888
JOHNSON, HY. C., American Fork, Utah.....1890
JOHNSON, Prof. O. B., Seattle, Washington.....1885
JOHNSTON, Dr. A. D., Allegheny City, Pa.....1891
JONES, LYNDS, Oberlin, Ohio.....1888
JONES, MARCUS E., Salt Lake City, Utah.....1890
JORDAN, A. H. B., Willsborough, Essex Co., N. Y.....1888
JORDAN, Prof. D. S., Leland Stanford, Jr., Univ., Menlo Park, Cala.1885
JOUY, P. L., Smiths. Inst., Washington, D. C.....1883
KEELER, CHARLES A., Berkeley, Alameda, Co., Cala.....1889
KELLOGG, VERNON L., Lawrence, Kansas.....1888
KENDALL, W. C., U. S. Fish Commission, Washington, D. C.....1889
KEYSER, LEANDER S., Columbus, Ohio..... 1891
KING, GEORGE GORDON, Newport, R. I.....1888
KIRKPATRICK, H. C., Meadville, Pa.....1891
KNOWLTON, F. H., U. S. Nat. Mus., Washington, D. C.....1883
KOCH, Prof. AUGUST, Williamsport, Pa.....1891
KOCH, FRED. W., Escondido, Cala.....1891
KOHN, GUSTAVE, 14 Carondelet St., New Orleans, La.....1886
LADD, SAMUEL B., West Chester, Pa.....1889
LAMB, CHARLES R., Cambridge, Mass.....1885
LAMB, Prof. ELI M., Friends' High School, Baltimore, Md.....1891
LANGDON, EDWIN, Central National Bank, New York City.....1891
LANO, ALBERT, Madison, Minn.....1890
LANTZ, Prof. D. E., Manhattan, Kansas.....1885
LAWRENCE, ROBT. B., Mills Building, New York City.....1883
LAWRENCE, ROBERT HOE, Seattle, Washington.....1890
LEWIS, E. G., Hartford, Conn.....1888
LEWIS, WM. H., Pawtucket, R. I.....1890
LEWIS, JOHN B., Eubanks, Pulaski Co., Ky.....1890
LILIENCRANTZ, T., Aptos, Cala.....1890
LINSKILL, DAVID J., Plymouth, Pa.....1891
LLOYD, WILLIAM, Brownsville, Texas.....1885
LOCKWOOD, Dr. SAMUEL, Freehold, N. J.....1890
LONG, H. B., Lake View, Mass.....1889

LOOMIS, JOHN A., Paint Rock, Concho Co., Texas.....1887
LOOMIS, LEVERETT M., Chester, S. C.....1883
LORING, J. ALDEN, Owego, N. Y.....1889
LUCAS, FREDERIC A., U. S. Nat. Mus., Washington, D. C.....1888
LUCAS, WM. H., Bridgeport, Conn.....1889
MACDOUGALL, GEO. R., 88 Wall St., New York City.....1890
MACGILLIVRAY, ALEX. D., Cornell Univ., Ithaca, N. Y.....1890
MACKAY, Prof. A. H., Halifax Academy, Nova Scotia.....1885
MACKAY, GEO. H., Nantucket, Mass.....1890
MACOUN, Prof. J., Geol. and Nat. Hist. Surv., Ottawa, Ontario.....1883
MCCORMACK, F. W., Leighton, Ala.....1891
MCGREGOR, R. C., 2847 Champa St., Denver, Col.....1889
MAITLAND, ROBERT L., 70 Broad St., New York City.....1889
MALI, CHARLES M., 329 Broadway, New York City.....1889
MARSHALL, ALFRED, 59 South Canal St., Chicago, Ills.....1886
MASON, EDWARD C., 377 Main St. Buffalo, N. Y.....1888
MATHER, SIDNEY G., Morristown, N. J.....1890
MELZER, JAMES P., Milford, N. H.....1891
MERRIAM, Miss FLORENCE A., Locust Grove, Lewis Co., N. Y. 1885
MERRILL, HARRY, Bangor, Maine.....1883
METCALFE, WM. C., 21 Cortlandt St., New York City.....1886
MILLER, G. S., Jr., 6 Bond St., Cambridge, Mass.....1886
MILLER, Mrs. OLIVE THORNE, 244 Macon St., Brooklyn, N. Y.....1887
MONTGOMERY, THOMAS H., JR., West Chester, Pa.....1891
MOORE, J. PERCY, 1931 Judson Place, Philadelphia, Pa.....1886
MOORE, Dr. H. D., New Lexington, Pa.....1891
MORCOM, G. FREAM, 870 North Park Ave., Chicago, Ill.....1886
MORRIS, GEO. SPENCER, Olney, Philadelphia, Pa.....1887
MORRIS, ROBERT O., Springfield, Mass.....1888
MORRISON, GEO. A., Fox Lake, Wis.....1891
MORTIMER, BENJAMIN, 348 Lafayette Ave., Brooklyn, N. Y.....1888
MURDOCH, JOHN, Smiths. Inst., Washington, D. C.....1883
NICHOLAS, Dr. GEORGE LAWRENCE, 386 Manhattan Ave., New York City.....1888
NICHOLS, J. M., Greene, Maine.....1890
NORRIS, J. PARKER, 723 Walnut St., Philadelphia, Pa.....1886
NORTON, ARTHUR H., Westbrook, Maine.....1890
NORTON, RICHARD, Cambridge, Mass.....1888
OBERHOLSER, HARRY C., Wooster, Ohio.....1888
OLDFIELD, W. A., Port Sanilac, Mich.....1891
OLDRIGHT, CHAS. D., Austin, Texas.....1890
ONG, PLUMMER L., Milan, Sullivan Co., Mo.....1888
OSBORN, Rev. WM., Golden, Col.....1890
PAINE, AUGUSTUS G., Jr., Room 60, Times Bldg., New York City...1886
PALMER, E. L., New Haven, Conn.....1891
PALMER, T. S., Dept. of Agriculture, Washington, D. C.....1888
PALMER, WM., U. S. Nat. Mus., Washington, D. C.....1888

PANNEPACKER, D. E., 2513 North 12th St., Philadelphia, Pa.....1888
PARK, AUSTIN F., 31 Boardman Building, Troy, N. Y.....1885
PARK, J. T., Warner, Tenn.....1890
PARKHOUSE, H. H., Tacoma, Washington.....1890
PEABODY, Rev. P. B., Owatonna, Minn.....1891
PEABODY, W. RODMAN, Cambridge, Mass.....1890
PEACOCK, W. F., Marysville, Cala.....1888
PEARSON, T. GILBERT, Archer, Fla.....1891
PECK, E. B., Brockport, N. Y.....1890
PENNOCK, C. J., Kennett Sq., Chester Co., Pa.....1888
PERKINS, CHAS. E., Hartford, Conn.....1888
PERNOT, E. A., Corvallis, Oregon.....1891
PETERSON, J. P., Luck, Wis.....1885
PETTIT, A. E., 15 Cortlandt St., New York City.....1889
PHILLIPS, A. H., 77 Biological Laboratory, Princeton, N. J.....1891
PIERCE, A. K., Renovo, Pa.....1891
PIERS, HARRY, Willow Park, Halifax, N. S.....1891
PLEASANTS, J. H., Jr., 606 Cathedral St., Baltimore, Md.....1888
PLUMMER, GORDON, 242 Purchase St., Boston, Mass.....1890
POPENOE, Prof. E. A., Manhattan, Kan.....1886
POSSON, NEIL F., Medina, N. Y.....1890
PRATT, W. E., Lake Forest, Ill.....1890
PRENTISS, D. W., JR., Washington, D. C.....1890
PRILL, Dr. A. G., Springville, N. Y.....1890
PRIME, Rev. WENDELL, 38 Park Row, New York City.....1889
RADCLIFFE, CARLETON R., 127 West 64th St., New York City.....1888
RAGSDALE, G. H., Gainesville, Texas.....1885
RAINE, WALTER, Hayden St., Toronto, Ontario.....1889
RALPH, Dr. W. L., 26 Court St., Utica, N. Y.....1888
RAUB, Dr. M. W., Lancaster, Pa.....1890
RATHBUN, FRANK R., 40 Franklin St., Auburn, N. Y.....1883
RAWSON, CALVIN L., Norwich, Conn.....1885
REDDINGTON, ALFRED P., 25 Second St., San Francisco, Cala.....1890
REED, CHAS. K., Worcester, Mass.....1890
REED, J. HARRIS, Beverly, N. J.....1890
RHOADS, SAMUEL N., Haddonfield, N. J.....1885
RICE, FRANK L., Evanston, Cook Co., Ill.....1886
RICHARDS, JOHN BION, 8 Barnaby St., Fall River, Mass.....1888
RICHARDSON, JENNESS, Am. Mus. Nat. Hist., New York City.....1888
RICHARDSON, W. M., Am. Mus. Nat. Hist., New York City.....1891
RICHMOND, CHAS. W., Patuca, Spanish Honduras.....1888
RIDGWAY, JNO. L., U. S. Geol. Surv., Washington, D. C.....1890
RIECKER, ERNST, 900 South 4th St., St. Louis, Mo.....1888
RIKER, C. B., South Orange, N. J.....1885
RILEY, Prof. C. V., U. S. Entomologist, Washington, D. C.....1885
RIVES, Dr. WM. C., 113 East 38th St., New York City.....1885
ROBBINS, WM. A., 528 Golden Gate Ave., San Francisco, Cala.....1888

ROBERTS, GEORGE W., West Chester, Pa.....1891
ROBERTS, W. F., 503 E St., N. W., Washington, D. C.....1888
RODDY, Prof. H. JUSTIN, Millersville, Pa.....1891
ROGERS, GEORGE H., Madison, Wis.....1891
ROOSEVELT, Hon. THEODORE, Oyster Bay, Queens Co., N. Y.....1888
ROWLAND, THOS., 182 6th Ave., New York City.....1890
ROWLEY, J., Jr., Am. Mus. Nat. Hist., New York City.....1889
RUSSELL, GEO. C., 144 West 7th St., Erie, Pa.....1888
RUSSELL, ROY, Kokomo, Indiana.....1891
SAGE, HENRY M., Albany, N. Y.....1885
SCHLEGEL, Miss MATILDE, 134 16th St., Buffalo, N. Y.....1889
SCHURR. THEO. A., Pittsfield, Mass.....1888
SCOTT, W. L., 74 Sparks St., Ottawa, Ontario.....1883
SCROGGS, Dr. G. A., Beaver, Pa.....1891
SEE, ABRAM W., Arlington, N. J.....1888
SEELY, HENRY M., Middlebury, Vt.....1890
SEITER, PHIL. J., Chattanooga, Tenn.....1888
SHARP, Miss ALDA M., Gladbrook, Iowa.....1889
SHELTON, GEO. H., Seymour, Conn.....1888
SHERRATT, W. J., 263 North 2d St., Philadelphia, Pa.....1891
SHORES, Dr. E. I., Soldiers' Home, Hampton, Va.....1883
SHORT, ERNEST H., Chili, N. Y.....1891
SLADE, JOHN A., 1134 Herkimer St., Brooklyn, N. Y.....1888
SMALL, FRED'K L., Provincetown, Mass.....1891
SMITH, CLARENCE A., 12 College Place, Colorado Springs, Col.....1889
SMITH, HORACE G., Jr., 2918 Lafayette St., Denver, Col.....1888
SMITH, Dr. HUGH M., 1248 New Jersey Ave., Washington, D. C.....1886
SMITH, JAMES E., East Killingly, Conn.....1889
SMITH, LUTHER H., Box 132, Pittsburgh, Pa.....1891
SMITH, PHILO W., Jr., Mona House, St. Louis, Mo.....1890
SMITH, S. SIDNEY, 59 Wall St., New York City.....1888
SMYTH, CLIFFORD, 435 East 116th St., New York City.....1890
SORNBORGER, JEWELL D., Cambridge, Mass.....1888
SOUTHWICK, E. B., Arsenal Bldg., Central Park, New York City.....1888
SOUTHWICK, WM. C., Raritan, N. J.....1891
SPELMAN, H. M., 62 Sparks St., Cambridge, Mass.....1883
SPRAGUE, JOHN C., 38 Wall St., New York City.....1891
STANTON, Prof. J. Y., Bates College, Lewiston, Me.....1883
STEBBINS, EDWARD S., Minneapolis, Minn.....1889
STEERE, Prof. J. B., Ann Arbor, Mich.....1890
STEPHENS, F., Santa Ysabel, San Diego Co., Cala.....1883
STOEY, W. W., Harrisburg, Pa.....1891
STONE, D. D., Lansing, N. Y.....1891
STONE, WITMER, Acad. Nat. Sci., Philadelphia, Pa.....1885
STREATOR, C. P., Garrettsville, O.....1889
STRODE, Dr. W. S., Bernadotte, Ill.....1889
STRONG, REUBEN M., Wauwatosa, Wis.....1889

STUDER, JACOB H., P. O. Box 2417, New York City.....1888
SURBER, THAD., White Sulphur Springs, West Va.....1890
SWALLOW, C. W., Willsburgh, Multuoma Co., Oregon.....1890
SWINBURNE, JOHN, Holbrook, Apache Co., Ariz.....1887
TALBOT, D. H., Sioux City, Iowa.....1885
TATLOCK, JOHN, Jr., Mutual Life Ins. Co., New York City.....1887
TAYLOR, ALEX. O'D., 124 Bellevue Ave., Newport, R. I.....1888
TAYLOR, HARRY R., Alameda, Cala.....1889
THOMPSON, ERNEST E., 86 Howard St., Toronto, Ontario.....1883
THOMPSON, FRANK J., Zoölogical Garden, Philadelphia, Pa.....1885
THORNE, Capt. PLATTE M., 22d Inf. U. S. A., Ft. Keogh, Montana..1885
THURBER, E. CARLETON, Alhambra, Cala.....1886
TODD, LOUIS M., Calais, Me.....1887
TODD, W. E. CLYDE, Dept. Agriculture, Washington, D. C.....1890
TOPPAN, GEO. L., 138 Jackson St., Chicago, Ill.....1886
TORREY, BRADFORD, Wellesley Hills, Mass.....1883
TORTAT, W. R. M., Atchison, Kansas.....1890
TOWNSEND, C. H., Smiths. Inst., Washington, D. C.....1883
TREAT, WILLARD E., East Hartford, Conn.....1885
TREICHLER, Dr. A. C., Elizabethtown, Pa.....1891
TROMBLEY, JEROME, Petersburg, Mich.....1885
TROTTER, Dr. SPENCER, Swarthmore College, Swarthmore, Pa.....1888
TURNER, Dr. M. H., Hammondsville, Essex Co., N. Y.....1885
TURNER, Dr. T. S., Huntington, N. Y.....1889
TUTTLE, Dr. CARL, Berlin Heights, O.....1890
VAN CORTLANDT, Miss ANNE P., Croton-on-Hudson, N. Y.....1885
VAN RIPER, PAUL, Niles, Mich.....1891
VELIE, Dr. J. W., Academy of Sciences, Chicago, Ill.....1886
VERRILL, Prof. ALPHEUS H., 86 Whaley Ave., New Haven, Conn....1888
VILARO, Dr. JUAN, Havana Univ., Havana, Cuba.....1888
VOORHEES, CLARK G., 59 East 75th St., New York City.....1888
WADSWORTH, D. S., 401 Albany St., Hartford, Conn.....1885
WAKEFIELD, J. R., Dedham, Mass.....1885
WALKER, Dr. L. R., Mansfield Valley, Pa.....1888
WARREN, Dr. B. H., West Chester, Pa.....1885
WEBSTER, FREDERIC S., 738 Broadway, New York City.....1886
WEBB, WALTER F., Geneva, N. Y.....1891
WELLS, Dr. JOHN A., Englewood, N. J.....1888
WEST, LEWIS H., Roslyn, Queens Co., N. Y.....1887
WEST, SAMUEL H., 76 Devoe St., Brooklyn, N. Y.....1889
WHEELER, DAVID E., cor. Park Ave. and 71st St., New York City...1888
WHITE, FRANCIS BEACH, Cambridge, Mass.....1891
WHITE, HARRY GORDON, Dep. of Agriculture, Washington, D. C....1889
WHITE, STEWART E., Grand Rapids, Mich.....1890
WHITNEY, Prof. E. R., Binghamton, N. Y.....1891
WHOLEY, W. N., Johns Hopkins Univ., Baltimore, Md.....1891
WICKHAM, H. H., Beaver, Pa.....1890

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DECEASED MEMBERS.

ACTIVE MEMBERS.

Date of Death.

BAIRD, SPENCER F.....Aug. 19, 1887.
GOSS, N. S.....June 8, 1891.
HOLDER, J. B.....Feb. 28, 1888.
WHEATON, J. M.....Jan. 28, 1887.

HONORARY MEMBERS.

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PARKER, WILLIAM KITCHEN.....July 3, 1890.
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SCHLEGEL, HERMANN.....Jan. 17, 1884
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HOMEYER, E. F. VON.....May 31, 1889.
MARSCHALL, A. F.....Oct. 11, 1887.
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WOOD, WILLIAM.....Aug. 9, 1885.

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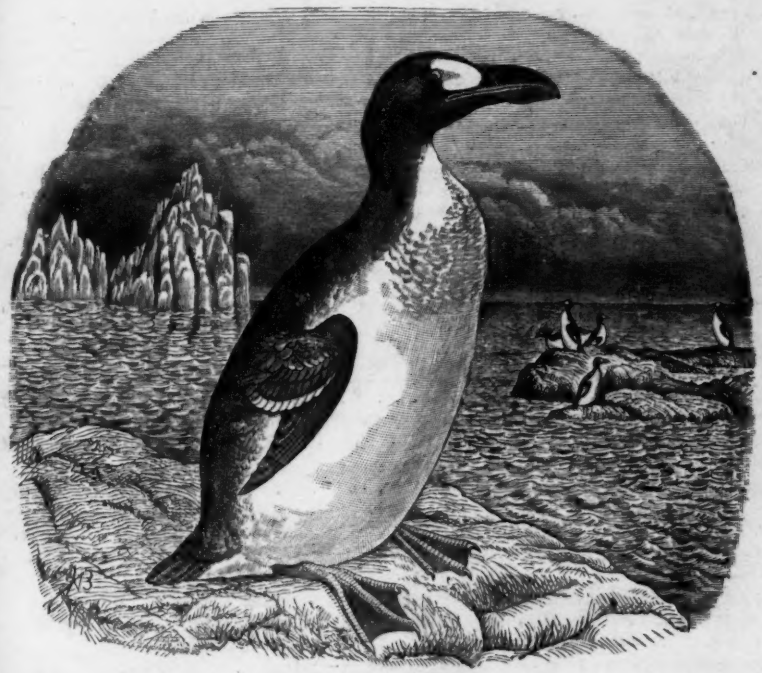

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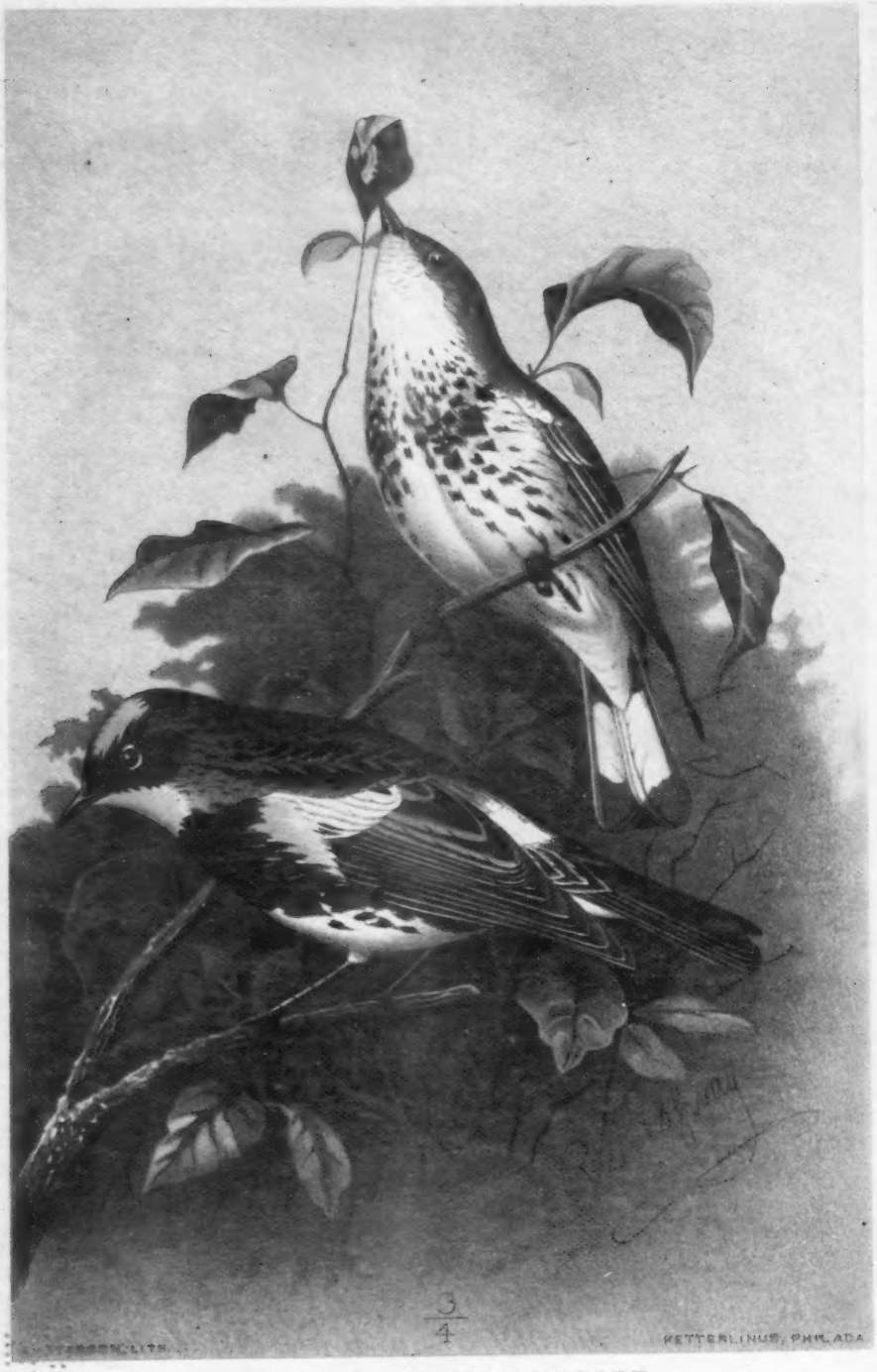

BLACK-FRONTED WARBLER

DENDROICA NIGRIFRONS BREWSTER

ADULT MALE AND FEMALE

THE AUK:

A QUARTERLY JOURNAL OF ORNITHOLOGY.

VOL. IX. JANUARY, 1892. No. 1.

THE BREEDING HABITS OF THE FLORIDA BURROWING OWL (*SPEOTYTO CUNICULARIA FLORIDANA*).

BY SAMUEL N. RHOADS.

So LITTLE relating to the habits of this race has been made known that I am induced to offer the following observations made during a recent visit to southern Florida. I arrived, April 24, 1891, at Fort Myers near the mouth of the Caloosahatchie River, and, engaging a small boat with guide, proceeded up the river, intending to penetrate the interior as far as Lake Okeechobee. After three days' exhausting work with sail, oar and pole, we reached 'Coffee Mill Hammock', a tiny grove of palmettoes on the north bank of the canal connecting Lake Hicpoochee with Lake Flirt. At this point I spent a day collecting birds, and in the course of my rambles chanced to meet a 'cracker' who was looking after some stock in the neighborhood and who said that he could take me to a place where there were "plenty of ground Owls." The next morning, having dismissed my former guide, I started across country with 'Jack.' We had a two-horse open wagon, a barrel of corn, can of provisions, and my baggage, in all making with ourselves a fair load for the little scrub ponies to drag across the twenty miles of prairie stretching between us and Nicodemus Slough, where, Jack assured me, there

were more Owls than I could carry away. We struck into and through the pines and live oaks, which here reach near the upper waters of the lake, in a northeasterly direction and emerging upon the prairie five miles beyond, took a direct easterly course across it.

The elevation of the land in Florida south of Lake Okeechobee is not more than twenty-eight feet above the Gulf of Mexico, that is, the average between high and low lands is at about the level of Lake Okeechobee* in the rainy season. Four feet above this level and higher grow the pines, within three feet of it flourish live oaks, within two feet of it grows the cabbage palmetto, and within a foot of it the saw palmetto. The true prairie region in this neighborhood comprises a vast extent of country whose elevation is less than a foot above the high water mark of Lake Okeechobee. At widely distant intervals in this plain occur circular mounds varying in extent from plots twenty feet in diameter to those of several acres, which are evidently composed of sand blown up by the winds of summer. Upon these, according as they range one, two or three feet above their surroundings we find dense clumps of saw palmetto, cabbage palmetto, or live oak hammocks. Those hammocks which are three feet high, contain all three species arranged symmetrically, the dwarf palmettoes forming the border, the cabbage palms coming next and mingling with the live oaks which crowd the centre. The prairie proper is thickly clad with short grass, indicating considerable fertility in the soil, and upon this subsist immense herds of half-wild cattle and hogs, and numerous deer. By the first of May the greater part of this area is three feet above the water level, and one may travel for miles without finding anything in the numberless dry lakes and water holes that is fit to drink, until he reaches some slough that communicates by a depressed channel with the main lake. Despite the greenness of this grassy wilderness the northern traveller who looks abroad over it, is involuntarily reminded of a desert—a sort of Sahara in miniature. The heat on his back, the dancing reflections of the semi-tropic atmosphere, the distant groups of tall palmettoes rising sheer from the plain, all conspire to impress him with the wonderful resemblance.

---

*Twenty feet.

Across this desert we proceeded, winding among the intervening clumps of scrub palmetto, bumping over their half-buried roots where it became necessary to make a short cut, until we entered a sloping piece of ground a mile or so wide, from which the water had but lately evaporated and which was evidently the site of a large, shallow pond. Traveling here was comparatively easy, and here Jack reported having seen Owls a few days previously. We had nearly reached the borders of this pond when my companion pointed to an indistinct spot near a low clump of palmettoes, saying with perfect confidence that it was an Owl. At that moment the animal, for so it proved, vanished, and in a few seconds reappeared on a low, sandy hillock a few feet from its former position and, bowing profoundly in opposite directions, sailed off a few rods to another mound where it continued to bow in the most ludicrous and deferential manner. Simultaneously another Owl appeared on the original hillock. Dismounting from the wagon, Jack whispered a few instructions, and each man approached his bird. I was too much entertained with the antics of mine to think of shooting it till the report of my companion's gun frightened both of us sufficiently to render my snap shot ineffectual; but after a short flight the bird alighted behind a clump of palmetto and was secured.

Jack having secured the male, we examined mound number one and found that the female had been surprised in the act of digging her burrow, over which the male had acted sentinel, and from which, after entering and giving her notice, he had reappeared in the manner described. The cavity was barely a foot deep and two feet long, dug in the wet sand near the margin of the pond and not ten feet from the palmetto bushes. Near it was the ruin of a former burrow from which Jack had procured eggs ten days previously.

Mound number two was then looked after. Its situation was at a lower level than the others, and the depth of the burrow below the surface was correspondingly less, being only three inches. It was about five feet long, and had two openings about midway between which was a cave-in caused by the trampling of cattle. Inserting the hand and giving a quick upward jerk, the thin sod was easily removed without much danger of snake or skunk bites, and when some two feet of the burrow were opened we found an egg. There were no others, indicating that the female had been trapped

during oviposition, had been forced to dig her way out in the opposite direction, and had then abandoned the site for a better one on higher ground where the danger from beast and flood could be avoided. This was evidently the pair Jack had previously robbed, so we see that *Speotyto* is nowise behind others of its family in the persistency with which it attaches itself to a given locality.

No other birds were seen in this place, but a mile farther on we found three more in a precisely similar location. These also had been robbed some days previously but had succeeded in making a new home near the old one, from which we procured four fresh eggs. In this case, as before, the male gave notice of our approach, but instead of showing fear, boldly flew toward us with a threatening chatter, while the female concealed herself among the long grass near the nest. Nicodemus Slough, our destination, was reached about six P.M. It is a low, swampy 'bonnet'-covered estuary reaching from the lower waters of Lake Hicpoochee northward across the prairie. It is about eight miles long, and at the place where we crossed it half a mile wide. The dry season had so reduced the flow of water from the surrounding lowlands that we could not detect it on crossing, though a week before the horses had here waded up to their bellies.

At this spot, in a large live oak and palmetto hummock, we spent the weary night amid a memorable chorus of alligators, frogs, Barred Owls and mosquitos. Our start next morning was an early one. Having loaded everything on the wagon and harnessed the horses, I armed myself with gun and hatchet and made my way through the swamp to the opposite side, where I was directed by Jack to walk along and keep a sharp lookout, he at the same time driving the team and hunting along the left bank. In the course of half an hour we had struck — especially on my side of the slough — a continuous colony, three miles long, of breeding Owls. The retreating waters of the adjoining slough had left a margin of flat, grass-grown sand, of varying width, between the swamp and the saw palmettoes, and extending indefinitely in the direction of the stream. This formed the breeding ground of several hundred pairs of Owls, and here in the course of three hours I made a thorough acquaintance with the outdoor and indoor life of a very interesting bird.

The actions of this species upon the near approach of an intru-

der to its nest are interesting and ludicrous in the extreme. If the pair have a full clutch of eggs, one parent is sure to be on the mound or just within the entrance, as often the female as the male. If the former, she makes far less demonstration than the male, and generally slinks away to the long grass, or behind the palmettoes, and peeps at you. If it be the male, he performs the most elaborate tricks, and either comes to meet you or circles about and alights on the level ground near the hole, frequently uttering as he does so a hurried succession of sounds between a chatter and a choke. In either case the sitting bird does not leave the nest, and if dug out will fight to the death though given the chance to escape.

If the birds are nest-building or have not laid a full clutch of eggs both of them are often found on the mound, sometimes, as it were, wing-in-wing (I have seen them bow together), but generally the female takes the traditional 'back seat' and the doughty father demands the countersign and braves the onset alone, while the weaker vessel makes good her retreat. In this case, should there be one in the burrow, the other utters a low half-audible cry which speedily brings its companion above ground.

When the burrow contains young you rarely surprise the adults below ground. Out of ten nests examined which held young of all ages I captured only one adult bird. This is owing to the extreme solicitude of the parents and the voracity of the brood which is always numerous. The anxiety of the old males whose young are being threatened is so great that I have had them strike my cap awry while digging, and in general the conduct of the females in comparison is shameful. On all occasions a wounded bird would make for the nearest hole with all possible speed and could not be dislodged without being dug out.

The utmost harmony prevailed in this widely scattered community. Where four or five pairs were living close together the males would combine their attacks upon me and the females would retire together to some secluded spot and have a talk. On one occasion an over-curious mother flew up from behind a bunch of palmettoes, and alighting thereon took a comical sidelong glance at me, but finding she was perceived returned to the ground. On only one other occasion did I see them alight otherwise than on the ground, although later in the afternoon I noticed

several sitting on a row of fence posts which ran through their domains precisely as *S. c. hypogæa* does in the West. On no occasion did I notice either young or old *sit* in the open air. They always stood upright, even when unconscious of my presence.

Every action of this species bespeaks a bird of eminently diurnal habits, but I have no reason to believe that they cannot range with equal freedom at night. From the nature of their food, however, I conclude they are more active in the daytime. The flight of this Owl, while rarely protracted, is well sustained and graceful. They made long trips to and from the water holes, which were often a mile distant, in search of food for their hungry brood, but on no occasion did I see them fly higher than thirty feet. The voracity of the young is phenomenal. I kept seven, of different ages, in a tin box for several days. Beside eating everything, fresh or putrid, that was offered, they attacked and devoured each other. I was forced to kill the three remaining cannibals to preserve them.

In no instance was there any evidence that the Owls utilized the homes of other animals. At the best, such places are very scarce in this region of Florida, and owing to the friable nature of the soil and the evident facility with which these birds dug for themselves, such a supposition seems unnecessary. With three exceptions all of the twenty burrows I explored were dug in the moist, sandy margin of the slough, from twenty to one hundred feet down the gentle, grassy slope between the thickly fringed palmetto bank and the water's edge. The more recently constructed burrows were invariably nearer the water, owing to the greater ease of digging in the wet sand. In these cases the burrow throughout its entire length would just graze the lower surface of the thin sod, occasionally even penetrating it, causing, in such an event, its abandonment. If not abandoned, one of the myriad roving cattle would be likely soon to set foot on it and break through, or a sudden shower might fill it with water. These unfortunate attempts were evidently those of young or late-paired birds, or those whose earlier housekeeping had been broken up by some prowling snake, raccoon, or prairie skunk, and who found it impossible to build a new dormitory in the dry, higher levels at this season.

The normal plan of architecture was as follows: a straight

descent of from 6 to 18 inches, then a level or slightly descending tunnel *in a northerly direction* from four to seven feet in length, at the end of which, in an oven-shaped pocket, often a foot in diameter and with flat roof, is placed the nest. The most frequent exception to this rule was a burrow starting as above and descending at an angle of 45° for three feet, then turning westwardly and proceeding with a slight inclination two or three feet farther or even rising abruptly to near the surface. In two instances I saved myself half an hour's digging by sounding the surface with a hatchet, and once the trouble of digging at all, by the hissing of the brood under the sod in a burrow that made a sheer pitch the length of my arm toward the antipodes. I mentioned above certain exceptions. These burrows must have been the work of very wise old birds, and from their appearance had been bequeathed from family to family through many generations. They were all found in a little grassy area twenty feet behind the outer edge of the palmettoes. One of them, which I unfortunately attempted to dig out with my hatchet, descended obliquely among the roots of a palmetto bush to a depth of four feet, made a semi-circular sweep of seven feet, and terminated in a nestful of seven half-fledged young, bedded among the thick rootlets. The size and general character of this burrow made me think it might have been the deserted earth of a fox; but an examination of the other two showed such a similarity with it that I am persuaded the Owls had done all this tremendous digging themselves.

Every completed burrow contained a nest for the reception of the eggs, always composed of broken pieces of dry cow droppings and the fragments of sod which had been removed at the commencement of the excavation. As may be imagined, there was no form nor comeliness to this kind of nest, the material being scattered about the rear end of the tunnel without attempted arrangement, and it as often covered the eggs as the reverse. Not a vestige of grass, feathers, or hair was detected in my examination.

On my side of the slough nearly all the nests contained young, the oldest having been hatched a fortnight, while others were not a day old, a great disparity of age being frequently noticed in the same family. Seven was the largest number of young, and six the greatest number of eggs found, the average being a little

above five. Jack's territory had been hunted a few days before and his success in egg collecting was proportionately better, as each disappointed pair had made another home and laid again. It was impossible to determine the length of incubation, but that the male bird undertakes a large share of this task in the daytime we received certain proof.

When the nest contained young, the mound and burrow were strewn with the rejected remains of their food, but, strange to say, there was no evidence that the young or old ejected the pellets so peculiar to rapacious birds. If they had done so we certainly should have found them. Among these remains were detected the legs and elytra of various grasshoppers and coleoptera, skulls of a very small rodent, skulls and backbones of fish, one of which was six inches long, the skins of snakes, the dried body of a lizard, frogs and crayfish, and feathers of four or five species of birds, noticeable among which were those of the Cuban Nighthawk, Bobolink and Savanna Sparrow.

Contrary to the usual experience with Burrowing Owls, I found *S. c. floridana* almost entirely free from vermin. I was forced to carry some of the dead birds in my shirt for lack of room in the satchel, yet I did so without the least annoyance from insects. Jack cautioned me to beware of snakes in the tunnels, but in examining forty the only signs I found of these reptiles consisted of skins and partially eaten fragments that had been carried thither by the birds. I was also told to look out for the small species of skunk inhabiting these regions. Three of the birds shot and two of the tunnels opened had the strong odor of this quadruped, but farther than this the skunks did not materialize.

OBSERVATIONS ON THE BIRDS OF JAMAICA WEST INDIES.

BY W. E. D. SCOTT.

II. A LIST OF THE BIRDS RECORDED FROM THE ISLAND, WITH ANNOTATIONS.

(*Continued from Vol. VIII, p. 365.*)

44. **Ajaja ajaja** (*Linn.*). ROSEATE SPOONBILL.—I did not meet with this species, nor has Mr. Taylor seen it on the island. It is included from records by Gosse ('Birds of Jamaica,' p. 346) and by March (Proc. Acad. Nat. Sci. Phila. 1864. p. 65).

45. **Guara alba** (*Linn.*). WHITE IBIS. — It seems somewhat uncertain whether this species is at present a resident or even a visitor in Jamaica, but it is alluded to by Gosse ('Birds of Jamaica,' p. 348) and later by Denny (P. Z. S. 1847, p. 39).

46. **Guara rubra** (*Linn.*). SCARLET IBIS. — This bird is an occasional visitor to Jamaica. See, for records, Gosse, 'Birds of Jamaica,' p. 348, Denny, P. Z. S. 1847, p. 39, and March, Proc. Acad. Nat. Sci. Phila. 1864, p. 65.

47. **Tantalus loculator** (*Linn.*). WOOD IBIS. — The only record of the occurrence of this species in Jamaica is that given by Denny, P. Z. S. 1847, p. 39.

48. **Botaurus lentiginosus** (*Mont.*). AMERICAN BITTERN.—Referred to by Gosse, 'Birds of Jamaica,' p. 346, and by March, Proc. Acad. Nat. Sci. Phila. 1864, p. 65. Mr. Taylor has no records of the species.

49. **Botaurus exilis** (*Gmel.*). LEAST BITTERN. —A rather common resident, of local distribution. From Mr. Taylor's notes I quote: "This species was found breeding at Port Henderson. Two sets of eggs were brought in. The last clutch, taken June 25, had two eggs in which embryos were formed. The nests were slight, flat structures of twigs on mangrove bushes in the swamps. I have never met with more than two, or at most three, of these birds in the course of a whole day, and they were always seen singly. So far as my experience goes they seem to prefer the vicinity of fresh or brackish water."

50. **Ardea occidentalis** *Aud.* GREAT WHITE HERON. — Referred to by Gosse, 'Birds of Jamaica,' p. 346, and by March, Proc. Acad. Nat. Sci. Phila. 1864, p. 63. Mr. Taylor says: "A large white Heron seen among the salines at Port Henderson may have been this species."

51. **Ardea herodias** *Linn.* GREAT BLUE HERON. — This would seem to be an uncommon bird in Jamaica. It is referred to by Gosse, 'Birds of Jamaica,' pp. 346, 347, at some length; also by March, Proc. Acad. Nat. Sci. Phila. 1864, p. 63.

52. **Ardea egretta** *Gmel.* AMERICAN EGRET. — Apparently a rare or accidental species in Jamaica. See Sclater, P. Z. S. 1861, pp. 70 80; also March, Proc. Acad. Nat. Sci. Phila. 1864, p. 63.

53. **Ardea candidissima** *Gmel.* SNOWY HERON. — Gosse regarded this species as a rare migrant visitor in winter ('Birds of Jamaica,' pp. 336, 337), and Mr. Taylor says: "Occasionally seen in the winter months."

54. **Ardea rufescens** *Gmel.* REDDISH EGRET. — Included from the record by March, Proc. Acad. Nat. Sci. Phila. 1864, p. 63.

55. **Ardea tricolor ruficollis** (*Gosse*). LOUISIANA HERON. — This seems the commonest Heron of the island, but is much more abundant on the southern than the northern shore. The following notes are from Mr. Taylor's experience: "This was the most common Heron seen at Port Henderson. The swamps and shallows in the early part of the day fairly teemed with them, yet they were shy and very difficult to approach from the open. The nests were in the highest mangrove trees, deep in the recesses of the swamps. When disturbed or alarmed at feeding they retired in a body to the tallest trees in the most inaccessible parts of the swamps, coming back, however, immediately when the danger appeared over. The birds were very restless at feeding time, making short flights here and there, and constantly changing positions, so that the scene was usually a very animated one. Many nests had young in June, while fresh eggs were obtained in the same month."

56. **Ardea cœrulea** *Linn.* LITTLE BLUE HERON. — A common resident and observed at many points during my stay. From Mr. Taylor's notes I quote as follows: "Next to *A. tricolor ruficollis* the most abundant Heron at Port Henderson, breeding in numbers in all the swamps; of a large number of eggs taken in July more than half were taken in a very advanced state of incubation. Pied or parti-colored birds are not infrequent and many young on leaving the nest show a large proportion of blue in the plumage. The white phase is common."

57. **Ardea virescens** *Linn.* GREEN HERON — Met with at Stony Hill once, and it was rather common about Boston. Mr. Taylor writes me: "I did not meet with one of these birds during all my stay at Port Henderson, though they are of common occurrence elsewhere, especially among the mangroves at the Pallisades. Like the little Bittern this species is only seen singly, and I have met with it along the banks of rivers many miles from the sea. It is resident and breeds, but I know nothing of its nesting habits."

58. **Nycticorax nycticorax nævius** (*Bodd.*). BLACK-CROWNED NIGHT HERON. — Mr. Taylor has not seen this species, nor did I meet with it. The records of Gosse ('Birds of Jamaica,' pp. 344-346) and of March (Proc. Acad. Nat. Sci. Phila. 1864, p. 65) are warrants for its admission to this list.

59. **Nycticorax violaceus** (*Linn.*). YELLOW-CROWNED NIGHT HERON. — This species I met with several times while on the island, where it is resident and of common occurrence locally. Subjoined are Mr. Taylor's interesting notes: "Common in all extensive mangrove swamps. Breeds.

Three eggs of this species were taken in June from the swamps near Passage Fort; the female was shot on the nest. At about dusk on calm, still evenings in the winter months these birds fly over from the Pallisades, singly or in pairs. They usually come flying very low, just clearing the tops of the houses on gaining the land. When it is too dark to distinguish them, their loud, startling note, a single *quack*, from which they take their name, tells of their presence in passing.

60. **Aramus giganteus** (*Bonap.*). LIMPKIN. CLUCKING HEN. — There can be no doubt that this was, in Gosse's day at least, by no means a rare bird on the island, but, if not extinct, it is at least very rare now. Mr. Taylor's notes are quoted from as follows: "No living example seen. A skin in the museum of the Jamaica Institute is labelled: 'presented by H. O. Vickers, Esq., 12-12-86. Locality Westmoreland.'"

61. **Rallus longirostris caribæus** *Ridgw.* MANGROVE HEN. — Having had little or no opportunity to study the Rails while on the island I quote from Mr. Taylor in regard to the species under consideration. "I first became familiar with the habits of the 'Mangrove Hen' during a visit to the extensive swamps bordering the Pallisades. They have always proved shy and difficult of approach. In the swamps near Port Henderson these birds nested in hundreds, but though I spent many hours wading through the shallows in the search for eggs, and counted at one time upwards of twenty-five or thirty nests, I did not see a single bird. At the Pallisades I have obtained many specimens, but only through lying in wait at the little open pools where they love to feed. They appeared most abundant at dawn and just before sunset, when they were very noisy. They called to one another with a harsh, stuttering *crek*, and often their cry alone determined their presence. Many clutches of eggs were brought in from the swamps at Port Henderson, varying in number from five to eleven. All the nests I examined were on the ground among the roots; one was almost sure to be found at the base of any one of the numerous detached clumps that dotted the shallows in all directions. The materials were roots and dry leaves, large quantities of which were used, sufficient, in most cases, to raise the eggs above the influence of wet."

62. **Porzana concolor** (*Gosse*). RED RAIL. WATER PARTRIDGE. — Mr. Taylor has not met with this species, nor was I so fortunate as to find it. The reader is referred to Gosse ('Birds of Jamaica,' pp. 369, 370) for the original description of the species and notes regarding it.

63. **Porzana flaviventris** (*Bodd.*). MINUTE CRAKE. — Mr. Taylor says in his notes as follows: "Shot near Passage Fort, December 27, 1886. Of frequent occurrence. Skin: length, 6 inches; bill olive; legs and feet yellowish."

64. **Porzana carolina** (*Linn.*). CAROLINA RAIL. STRIATED CRAKE. — The following I quote from Mr. Taylor's notes: "One shot on one of the canals near Passage Fort, December 27, 1886. Not uncommon in the winter months. Skin: length, 9 inches; bill yellowish at base, merging into olive brown."

65. **Porzana jamaicensis** (*Gmel.*). BLACK RAIL. LITTLE RED-EYED

CRAKE. — Resident according to Gosse who procured specimens in August and in February ('Birds of Jamaica,' pp. 375, 376).

66. **Ionornis martinica** (*Linn.*). PURPLE GALLINULE. SULTANA. — Mr. Taylor tells me that he has had no personal experience with this species though it is said to be resident and not uncommon in many inland swamps. Gosse speaks of it as "not uncommon" and gives details as to where he found it ('Birds of Jamaica,' pp. 377-380).

67. **Gallinula galeata** (*Licht.*). FLORIDA GALLINULE. SCARLET-FRONTED GALLINULE. — A common resident species in suitable localities. At Boston, Portland Parish, I met with them frequently, and took two very young birds in the black downy plumage, perhaps ten days old, on January 23, 1891.

From Mr. Taylor's notes I quote: "Abundant in all wet places where there is suitable cover, salt marshes excepted. Along the line of railway between Kingston and Spanish Town is an extensive line of mangrove swamp, in some places bordering the track on either side. Here, in every month and at almost all hours, these birds can be seen feeding among the rank growth at the edges of the swamp or running swiftly among the roots of the mangroves, scarcely alarmed by passing trains. Among the common people this bird is always called the Coot. I have had eggs brought me at the end of the year as well as in the months of May and June."

68. **Fulica americana** *Gmel.* AMERICAN COOT. — A common resident, but perhaps not as plentiful as *Gallinula galeata*. From Mr. Taylor's notes I quote the following, as of interest: "Abundant, though not seen as often as the common Gallinule. Of eggs taken in May and June some were fresh, and others were in an advanced state of incubation. More than one brood probably is reared."

69. **Recurvirostra americana** *Gmel.* AMERICAN AVOCET. — Mr. Hill informed Gosse of the occasional visits of this species to the island ('Birds of Jamaica,' p. 389). It must be considered, however, as rare or casual at the present time, for it has not been observed by Mr. Taylor.

70. **Himantopus mexicanus** (*Müll.*). BLACK-NECKED STILT. — A not uncommon winter resident in suitable localities, remaining till late in the spring. The following interesting notes I quote from Mr. Taylor: "Until late in the month of June small companies of these Stilts frequented the swamps snd salines at Port Henderson. They were often in company with Herons, fishing in the shallows close to the bordering mangroves where the water reached above the tarsus. A few birds probably stay to breed."

71. **Philohela minor** (*Gmel.*). AMERICAN WOODCOCK.—The evidence as to the occurrence of this species in Jamaica seems very slight and rests largely on hearsay. See Gosse, 'Birds of Jamaica,' p. 354. Mr. Taylor has been unable to learn of any specimens.

72. **Gallinago delicata** (*Ord*). WILSON'S SNIPE. — A regular winter visitor to the island. These birds were not uncommon at Boston late in January. A female was taken on the 23d of that month. Gosse says that

the birds are "rather common from November to April" ('Birds of Jamaica,' p. 353). Mr. Taylor speaks of it as "occasionally seen."

73. **Macrorhamphus griseus** (*Gmel.*). DOWITCHER. — Mr. Taylor gives me this species in his list of birds observed, without comment. Mr. Cory refers to Jamaica records ('Birds of the West Indies,' p. 233). It would appear that Gosse had confounded this or the next species with *Gallinago delicata* ('Birds of Jamaica,' p. 353, lines 6-16).

74. **Macrorhamphus scolopaceus** (*Say*). LONG-BILLED DOWITCHER. — There is apparently the same ground for including this species in the present list, as there is for its near ally, the preceding species. Mr. Taylor does not mention it, however.

75. **Micropalama himantopus** (*Bonap.*). STILT SANDPIPER. — Recorded by March, Proc. Acad. Nat. Sci. Phila. 1864, p. 67. Mr. Taylor gives it to me in his list without comment.

76. **Tringa canutus** *Linn.* KNOT. — Recorded by Gosse ('Birds of Jamaica,' p. 354) and by March (Proc. Acad. Nat. Sci. Phila. 1864, p, 67). Mr. Taylor has not seen the species.

77. **Tringa maculata** *Vieill.* PECTORAL SANDPIPER. —This is included by A. and E. Newton in their list (Handb. Jamaica, 1881, p. 116) but is not recorded by Mr Taylor.

78. **Tringa fuscicollis** *Vieill.* WHITE-RUMPED SANDPIPER. — There are records from the island: Sclater, P. Z. S. 1861, pp. 70, 80; Albrecht, J. f. O. 1862, p. 205. Mr. Taylor has not observed it.

79. **Tringa minutilla** *Vieill.* LEAST SANDPIPER. — This seems to be a regular but not very common winter visitor and migrant.

80. **Ereunetes pusillus** (*Linn.*). SEMIPALMATED SANDPIPER. — This Sandpiper would seem to occupy about the same position in the bird fauna of the island as the last. For remarks as to the probability of the occurrence of *Ereunetes occidentalis* Lawr., see Cory, 'Birds of the West Indies,' p. 234.

81. **Calidris arenaria** (*Linn.*). SANDERLING.—Mr. Taylor gives this as a common winter visitor. He says the strip of sand beach dividing Kingston Harbor from the sea, known as the Palisades, is a favorite resort of these birds.

82. **Limosa**———.— A species of *Limosa* is referred to by March (Proc. Acad. Nat. Sci. Phila. 1864, p. 64), but not fully determined.

83. **Totanus melanoleucus** (*Gmel.*). GREATER YELLOWLEGS. — There are numerous Jamaican records. Mr. Taylor gives it in his list, but says he has not personally observed it.

84. **Totanus flavipes** (*Gmel.*). YELLOWLEGS. — A regular winter visitor, and apparently more common than the last. Mr. Taylor's notes are to this effect.

85. **Totanus solitarius** (*Wils.*). SOLITARY SANDPIPER. — A common winter resident in suitable localities. Common at Boston in December, January, and February. A male taken on January 21 at this point is moulting. This is particularly apparent in the primary quills, the first of which in each wing have just been replaced. The new feathers are particularly dark.

The following notes are from Mr. Taylor: "Very common at the end of the year on all sandy beaches. They are usually seen singly, though I have more than once met with small parties composed of six or eight birds. They frequent the edges of the shores, picking among the weeds and refuse and following the retreating waves for food. The earliest record of their arrival, that I can find among my notes, is dated September 4."

86. **Symphemia semipalmata** (*Gmel.*). WILLET.—There are records by both Gosse ('Birds of Jamaica,' p. 354) and March (Proc. Acad. Nat. Sci. Phila. 1864, p. 67). Mr. Taylor tells me that he has not met with the species, and it must be considered rare or casual.

87. **Bartramia longicauda** (*Bechst.*). BARTRAMIAN SANDPIPER.—This is also only a casual or very rare visitor to the island. The only record is that given by March (Proc. Acad. Nat. Sci. Phila. 1864, p. 67), and this appears to be somewhat doubtful. Mr. Taylor has no personal records of the species.

88. **Actitis macularia** (*Linn.*). SPOTTED SANDPIPER.—I found this species not uncommon in suitable localities whenever I was able to investigate the bird fauna of the island. This was from late in November till the last of February. Gosse says ('Birds of Jamaica,' p. 349): "It arrives from the north about the end of August, and remains certainly till after the middle of April, and I am not sure that individuals do not stay all the summer." Mr. Taylor gives me the following notes: "This species is probably a resident. It is common in favorable localities, but I have no notes regarding it."

89. **Numenius longirostris** *Wils.* LONG-BILLED CURLEW.—Apparently a rare or casual visitor. Referred to by both Gosse ('Birds of Jamaica,' p. 348) and March (Proc. Acad. Nat. Sci. Phila. 1864, p. 68). Mr. Taylor gives me the following notes: "A Curlew reported to me as seen near Milk River in Clarendon during the winter months may be this species."

Besides *Numenius longirostris*, there are evidently one or two other species of Curlews or Godwits that seem to have occurred on the island. From the following quotation from Gosse ('Birds of Jamaica,' p. 348) it will be seen that the identity of these is uncertain. "On the same authority [Mr. Hill] I mention two species of Curlews, the one known as the Black Curlew, which is *Numenius longirostris*, and the other called the White Curlew, which may be *N. hudsonicus*, or perhaps *Ibis alba*."

90. **Charadrius squatarola** (*Linn.*). BLACK-BELLIED PLOVER.—Records from Jamaica by both Gosse ('Birds of Jamaica,' p. 333) and March (Proc. Acad. Nat. Sci. Phila. 1864, p. 66). Mr. Taylor has no personal record of this nor of the following species.

91. **Charadrius dominicus** *Müll.* AMERICAN GOLDEN PLOVER.—There are several well-authenticated records of its occurrence on the island: Gosse, 'Birds of Jamaica,' p. 333; March, Proc. Acad. Nat. Sci. Phila., 1864, p. 66; Cassin, *ibid.*, p. 241; Albrecht, J. f. O., 1862, p. 205.

92. **Ægialitis vocifera** (*Linn.*). KILLDEER.—This is apparently a common resident species in suitable localities throughout the island. At Constant Springs and on the Liguanea Plain I saw them constantly

throughout the months of November and December, sometimes singly, sometimes in pairs, and oftenest in small flocks. During my stay on the north side of the island, from the last of December till the middle of March, I saw them daily in suitable localities. At Boston a flock of twenty to thirty individuals frequented the large pasture below the house during the entire three months spent at this point. This flock still remained unbroken on March 17, the day I left this point.

The following record of the breeding of the species I quote from Mr. Taylor's notes: "An abundant resident species, though I know nothing of its habits. It is described as frequenting bare open localities rather than marshes, etc., and I have never met with it near the seashore or even in the vicinity. Three eggs received in July last (much incubated) labelled 'Ring-tailed Plover,' are obviously referable to this species."

93. **Ægialitis semipalmata** *Bonap.* SEMIPALMATED PLOVER. — See Gosse, 'Birds of Jamaica,' p. 333, and March, Proc. Acad. Nat. Sci. Phila. 1864, p. 66, also Albrecht, J. f. O. 1862, p. 205, for records from Jamaica.

94. **Ægialitis meloda** (*Ord*). PIPING PLOVER. — The following notes are kindly furnished me by Mr. Taylor: "In October, 1887, Piping Plover were abundant among the lagoons and mangrove swamps at the Pallisades; they moved about in large flocks which, when once alighted on the shell-bestrewn beaches, it was impossible to detect."

95. **Ægialitis wilsonia** (*Ord*). WILSON'S PLOVER.—From Mr. Taylor's notes I quote: "This was the only Plover seen at Port Henderson. Small flocks daily resorted to the large shallows frequented by the Herons and Stilts. It is apparently resident."

96. **Arenaria interpres** (*Linn.*). TURNSTONE.—From Mr. Taylor's notes I quote as follows: "On a much later date in June than that on which I last saw the Black-necked Stilt, three Turnstones were shot near Passage Fort; their plumage was then undergoing change. The occurrence of these birds at this time of the year seems worthy of note, though these individuals may have been only stragglers from the main flocks, or perhaps barren birds. During the winter months the Turnstone is common in all favorable localities. It was the first bird I saw on landing at the Morant Cays in April, 1890. At that time large flocks frequented the different islets particularly the largest two. In the mornings and afternoons they fed along the shores, as well as on many of the bare open spaces where the grass had been burnt away and from which I often flushed a flock."

97. **Jacana spinosa** (*Linn.*). The following notes are from Mr. Taylor, and he kindly showed me the bird in question: "Notice of the species here, hitherto recorded only from Cuba, Haiti and San Domingo, is based on a specimen of an immature bird in the collection of the Institute of Jamaica, where it remained for a long time in a neglected state, uncared for and unidentified. It is labelled '12-12-86, presented by H. O. Vickers, locality, Westmoreland.' The sex is undetermined. I have not met with the living bird."

(*To be continued.*)

HABITS OF THE ESKIMO CURLEW (*NUMENIUS BOREALIS*) IN NEW ENGLAND.

BY GEORGE H. MACKAY.

FROM the shores of the Arctic Ocean, where they breed, to Patagonia, where they probably winter (Ibis, 1878, page 404), is a journey of seven thousand miles; yet the Eskimo Curlews, familiarly known as Doughbirds, compass it every year on their migrations. Starting from the far north after incubation is over, the older birds, which are then generally lean and in poor condition, commence to straggle down in small parties until about the first of August they reach Labrador, where they remain, with constantly increasing numbers, for about three weeks, becoming extremely fat upon the berries of the *Empetrum nigrum* (known as curlew-berry, crow-berry or bear-berry) to which they are particularly partial.

About the twenty-third of August, at such time as the weather conditions prove favorable for migration southward, they undertake their long journey to the southern portion of the South American continent. They are then in the best physical condition, and are frequently so fat that when they strike the ground after being shot flying the skin bursts, exposing a much thicker layer of fat than is usually seen in other birds, hence their local name 'Doughbird,' from the saying "as fat as dough." At this season they are considered by epicures the finest eating of any of our birds, and consequently they are watched for and sought after by sportsmen with great perseverance during the very short period that they are expected to pass along this coast during their migration southward. They suffer but little, however, in New England from such pursuit, as the number killed in the great majority of years is trivial and has no effect in diminishing their numbers.

When I take a retrospective view for a series of years I am more than ever impressed with the few birds killed except in some very exceptional year. In most years they are far from being abundant, in fact are rather the reverse. I am inclined to the opinion that these birds generally pass our coast much further from land than has been usually supposed, for it rarely happens

that any large numbers of them are deflected over the land by ordinary storms, very severe thunder and lightning with heavy rain, or dense fogs, apparently being required to drive them from their customary line of flight and force them to seek land until more favorable conditions for migrating take place, for they are unusually strong and high fliers with great endurance. I believe also, that it is only in exceptional years that we see a portion of the principal movement of these birds while making their southern migration.

Those which do visit us almost invariably land with their boon companions, the American Golden Plover, of whose flocks I have frequently noticed they were the leaders, and I can scarcely call to mind, as I write, an instance where any number of Eskimo Curlew have landed without there being more or less Golden Plover present at the same time.

Those birds which may come cannot, if they would, remain any longer than is absolutely necessary, for they are so harassed immediately after landing that the moment there occurs a change in the weather favorable for migration they at once depart. They appear to leave the coast at Long Island, New York, and strike further out to sea, and then are not seen on the Atlantic coast for another year.

It is on the spring migration to their breeding grounds, while passing through the United States and especially along the Mississippi Valley, that they suffer, being unmercifully shot in many places on the route, particularly in Nebraska. Like the American Golden Plover (*Charadrius dominicus*) the Eskimo Curlew never returns in the spring to the North via the Atlantic coast.*

Of those I have observed in New England during a series of years I may say that most of their habits closely resemble those of the Golden Plover. In migration they fly in much the same manner, with extended and broadside and triangular lines and clusters similar to those of Ducks and Geese at such times. They usually fly low after landing, sweeping slowly over the ground,

*The only Eskimo Curlew that I have ever heard of being obtained in the spring in New England was shot by my friend Mr. Augustus Denton on Cape Cod, Mass., about the end of May, 1873. It was a lone bird. Mr. Denton told me that he always supposed it was a bird which had been wounded the previous autumn and had managed to live through the winter; the reason for this conclusion was the condition of the bird, it being very thin, and sedgy in taste when eaten.

apparently looking it over, generally standing motionless for quite a little while after alighting, which, owing to their general color approximating so closely to the withered grass, renders it difficult at times to perceive them. I have had a flock of fifty or sixty alight within thirty yards of me, and have been unable to make out more than two or three birds. If disturbed they will frequently alight again at no great distance, if not previously harassed, and under the same conditions they can be approached at all times, for they are either very tame or very shy.* They seek out, and are found in, the same localities selected by the Golden Plover (see Auk, Vol. VIII, p. 17) with which they generally associate if any are in the vicinity, there always being a strong friendship between them. They are not so active as the Plover; on the ground they appear less inclined to move about, especially after landing and during rainy weather when I have at times noticed them standing on the ground quite close together, every bird headed to the wind, with heads and necks drawn down and resting on their backs, with the rain running off their tails. At such times they could be approached on foot to within half a gunshot, showing little fear.

They are said to make a whistle somewhat similar to the Hudsonian Curlew's (*Numenius hudsonicus*), only very much finer in tone. The only note I have ever heard them make is a kind of squeak, very much like one of the cries of Wilson's Tern (*Sterna hirundo*), only finer in tone. If one or more of these birds are wounded, after shooting at a flock, they will often keep calling and jumping up, trying to fly, which causes the remainder to hover over or in near proximity to the wounded ones, thus frequently affording an additional shot. They are very gregarious, and unless much harassed will come with the greatest confidence to either Golden Plover, or Curlew decoys.

The young birds do not as a rule make their appearance in New England before the eighth or tenth of September, continuing up to about October first. They appear very gentle and

*While on Nantucket Island they seem to prefer the ground near the headlands adjoining the beach shore, even among the beach grass, probably on account of the abundance of the large gray sand spider (*Lycosa*) which lives in holes in the sand in such localities. They feed on this spider and also eat the seeds of the poverty-grass (*Hudsonia tomentosa* Nutt.), especially when it is on ground which has been burnt over.

tame.* I have occasionally shot the older birds on the Island of Nantucket, with their vent stained purple from the berries of the *Empetrum nigrum* (probably obtained in Labrador).

In order to give some idea that may serve as an indication when the Curlew moves southward, I have copied the following from my notes, — my place of observation being the Island of Nantucket, Mass. The years 1858 to 1871 and 1873-1876, both inclusive, were given me by a friend, and are for Cape Cod, Mass.

1858, Aug. 31.—Some Eskimo Curlew, with Golden Plover.

1859, Aug. 29.—Some Eskimo Curlew, with Golden Plover.

1860, September.—Some Eskimo Curlew during the month.

1861, Sept. 5.—First birds shot,—with Golden Plover.

1862.—No birds.

1863, Sept. 5.—No birds of any account until Sept. 5 when an *immense flight*, the birds remaining through September on Cape Cod. Over 200 shot on Nantucket. The wind was light, southwest, with thick fog. It was northeast the previous day. The largest flight known on the island of late years.

1864.—No birds.

1865.—No birds.

1866, September.—A very few birds. No flight.

1867.—No flight.

1868, September.—No birds until September, when a very few. No flight.

1869, September.—No flight. A few scattering birds only.

1870.—Only a very few scattering birds this year.

1871.—No flight or birds.

1872, Aug. 29.—Raining and blowing very hard with wind southeast. Some Eskimo Curlew landed. Saw one flock of fifty.

Sept. 15.—Cape Cod. A flight, but did not stop; a few scattering birds landed; shot six.

1873, Aug. 25.—Some birds.

1874.—No flight or birds, an unusually poor year.

1875.—No Eskimo Curlew noted, nor have I seen any on Nantucket. Some shot on Cape Cod Sept. 5,—the first this year.

1876.—Some birds in September.

1877, Aug. 27.—A severe rain last night, and a good many Eskimo Curlew landed; I saw 250 (estimated) up to three o'clock P. M. today, the same birds that came last night. This morning until ten o'clock A.M. thick fog; then came out *hot*. Saw 100 Eskimo Curlew on the 29th.

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*There is a way of determining the old birds from the young, where there is little difference in plumage to distinguish them; on bending the legs the former's will break, the latter's will not.

1878, Aug. 25.—Slight rain this evening and night; a few Eskimo Curlew landed; saw one flock of 60 or 70 birds (estimated); wind light, north and west; on the 27th saw a flock of 50 birds (estimated).

1879.—Shot none, and have none noted.

1880.—Up to Sept. 10 only twelve Eskimo Curlew were shot on the Island.

1881, Sept. 2.—Tonight some Eskimo Curlew landed with American Golden Plover; the wind was northeast and weather thick; saw a flock of 50 on the 3d; and 65 on the 4th.

1882.—Have only heard of about twenty-five Eskimo Curlew during the entire season.

1883, Aug. 26.—On the night of the 25th and morning of the 26th it rained, and blew very hard from the northeast (northerly and northwesterly weather having previously prevailed). This storm was local, as far as New England was concerned. New Jersey and New Brunswick also had storms, but *in between* these points nothing severe was noticed. During the night of the 25th and next day (26th) the Eskimo Curlew landed with Golden Plover, both in large numbers, and nearly evenly divided as to numbers, there being rather less of the Curlew. On the 29th all birds had left. This was the first flight of either kind this season.

1884, Aug. 31.—A *very* few Eskimo Curlew landed; wind southeast. A very large flight of Golden Plover and some Eskimo Curlew passed Cape Cod and Nantucket Island today, but none to speak of landed or were shot at either place. The wind was southeast, light, with clear weather, at the Cape, great numbers being seen passing, mostly in the afternoon. It was foggy on Nantucket during the morning.

1885.—I have not seen an Eskimo Curlew this season; but eight having been shot on the Island, these came after September 10.

1886, Aug. 24.—Very severe thunder and lightning tonight, accompanied with severe rain, wind northeast, blowing hard; a few scattering Eskimo Curlew landed with a very large number of Golden Plover.

1887, Aug. 28.—Shot one Eskimo Curlew.

Sept. 18.—Shot one Eskimo Curlew. Not on the Island much this season.

1888, Sept. 1.—Quite a number of Eskimo Curlew landed this afternoon, wind southwest, light, thick fog. About all the birds that landed on the 1st left the next morning.

Sept. 26.—Shot one.

1889, Sept. 11.—On this night there was considerable rain and fog, with wind southeast. A small number of Eskimo Curlew landed. There has been a circular storm, the northern limit of which was Long Island, N.Y.; it was considered the severest for twenty years; it came up from the West Indies following the Gulf Stream, Nantucket Island only having the remnants of the outside edge of it. No birds either Eskimo Curlew or Golden Plover landed during the early stage of this storm, those which did appear arriving when it was about over.

Sept. 22.—I saw four, and shot one, the wind being northwest and cold.

Sept. 23.—I saw three more, but think they were the ones seen yesterday.

Sept. 29.—I saw and shot two.

Oct. 2.—I saw two and shot them.

All these late birds, I think, had been living on the Island of Nantucket since the Sept. 11 landing. The summer of 1889 has been unusually wet and very cool.

1890.—Some fifteen Eskimo Curlew are reported to have been seen this season; none have been killed to my knowledge; I have not seen any. Some birds passed Tuckernuck and Nantucket on Sept. 18, a few of which remained over night; all gone next day.

1891, Aug. 20.—Thirteen were seen, they remained during the next day and then departed.

Sept. 1.—I saw one.

Sept. 7.—Three birds shot on Tuckernuck Island.

Sept. 13.—Two seen, one shot.

Sept. 15.—Two shot from a flock of Hudsonian Curlew.

Sept. 17.—Flock of thirteen seen. Up to Oct. 1 the birds above enumerated as being shot or seen comprise the entire number killed or noted on the Islands of Nantucket and Tuckernuck for this year.

A PRELIMINARY LIST OF THE BIRDS OF SAN JOSÉ, COSTA RICA.

BY GEORGE K. CHERRIE.

(*Continued from Vol. VIII, p. 279.*)

17. **Dendroica cærulea.**—I have seen the Cerulean Warbler only four times in Costa Rica. The first was a young male taken Aug. 24, 1890, in company with a lot of *D. æstiva* and *D. blackburniæ*. The other three were also young birds and were taken as follows: male Sept. 12, female Oct. 7, and female Oct 24, 1890.

18. **Dendroica dominica.**—Oct. 4, 1891, I saw a handsome male in the central park. It is the only example I have seen in Costa Rica.

19. **Seiurus noveboracensis.**—A series of twenty examples were taken between the middle of September and the last of May.

20. **Seiurus aurocapillus.**—I have taken but one at San José, and only three in Costa Rica.

21. **Seiurus motacilla.**—Rare.

22. **Oporornis formosa**—I took a single female Oct. 7, 1890.

23. **Geothlypis trichas.**—In three years' collecting only five have been taken. These evidently belong to the eastern North American form.

24. **Geothlypis philadelphia.**—Not uncommon from the middle of September until the first of April.

25. **Geothlypis macgillivrayi.**—There are only three specimens in the Museum collection

26. **Geothlypis caninucha icterotis.**—Abundant resident about San José. Breeding commences the latter part of May. See further Proc. U. S. Nat. Mus., Vol. XIV, p. 526.

27. **Icteria virens.**—All specimens taken are in fully adult plumage.

28. **Sylvania pusilla pileolata.**—Adult and young birds are taken in about equal proportions.

29. **Sylvania canadensis.**—Of fourteen specimens collected about the city only one proved to be a male; that one was in immature plumage. The females also are duller than spring examples from the North.

30. **Basileuterus delattrii.**—One of the most abundant resident birds in the vicinity of San José. Breeding commences the last of May. I think only one brood is reared each year. A nest brought with two fresh eggs and the dead female to the Museum, June 6, 1890, is constructed of dry grass and fine rootlets, lined with horse hairs. Outside it measures 2.50 inches deep by 4.50 in diameter, inside 2.10 deep by 1.87 diameter. It was placed on the ground at the foot of a tree in a large coffee plantation. The eggs are white, thickly speckled, especially about the larger end, with cinnamon-rufous. They are oval in shape, and measure .75 × .57 and .77 × .55 inch.

31. **Setophaga ruticilla.**—Males in adult plumage are seldom seen about the city. At lower altitudes adults seem quite as common as young.

32. **Progne chalybea.**—A resident species about San José, but most abundant during the breeding season from May to the last of July. A favorite nesting site is in the hoods of the arc electric street lamps. The young do not differ from the adult bird except in having softer plumage.

33. **Chelidon erythrogaster.**—Abundant from September until March. Birds in perfect plumage are rarely seen. In 1890 the first arrivals were noted Aug. 27.

34. **Atticora cyanoleuca montana.**—A common resident. Breeds in the roofs of the houses. The young birds begin appearing about the first of July. They differ from the adult in being washed with pinkish-buff below, including the under tail-coverts, while above the metallic lustre of the feathers is not so bright. In some examples the throat and belly are white and the breast is crossed by a buffy band.

The male of a pair that had their nest in the roof of the Museum was accidentally killed before the eggs hatched. The female did not desert her post, and when the eggs were hatched attended to the wants of the young alone.

35. **Stelgidopteryx serripennis.**—Common resident. Breeds abundantly.

36. **Vireo olivaceus.**—Not at all common anywhere or at any time in Costa Rica.

37. **Vireo flavoviridis.**—I cannot add anything to my notes on this species published in this journal, Vol. VII, p. 329.

38. **Vireo philadelphicus.**—The earliest arrival I have noted was on Oct. 21, 1890.

39. **Vireo flavifrons.**—The first arrival in 1890 was noted on Oct. 4. This and the preceding species are rare birds about San José.

40. **Cyclorhis flavipectus subflavescens.**—Common. A sweet and tireless singer for about five months in the year, from February to July, during the breeding season, usually concealing itself amid the dense foliage at the top and middle of the low trees bordering the fields, where, out of sight of prying eyes, it pours forth melody loud and clear.

41. **Arbelorhina cyanea.**

42. **Arbelorhina lucida.**—These two species of Blue Creepers are only transient visitors in the neighborhood of San José, appearing early in September and lingering until December. They are most abundant during October, feeding together in small flocks in the 'jocote' trees, (*Spondias edulis*). It is only during the time this plum-like fruit is ripening that the birds are found.

The males of the two species are known under the name 'Rey de Picudos', while the females are only 'Picudos'.

43. **Euphonia.**—Although I have only taken five of the ten Costa Rican species of *Euphonia* in the vicinity of San José, three of the other forms are frequently to be seen for sale in the market, and I have thought it might not be out of place to present not only a list of all the Costa Rican species but also a key by which the different species may be known. Below is the key and following it are my notes on the different species. I might here add that I have never seen examples of either *E. gnatho* or *E. laniirostris*.

Key to the Species of Euphonia found in Costa Rica.

a. Size relatively small, wing not more than 2.25 inches, usually less.
  b. Outer tail-feathers only faintly (if at all) marked with white on inner webs, and under tail-coverts not whitish.
    c. Crissum chestnut. . . . . *gouldi*.
    c'. Crissum yellowish. . . . . *luteicapilla*.
  b'. Outer tail-feathers distinctly marked with white on inner webs, or under tail-coverts whitish.
    c. Middle of belly and crissum white or whitish. . . *minuta*.
    c'. Middle of belly and crissum yellow or yellowish. . *affinis*.
a'. Size relatively large, wing more than 2.25 inches.
  b. Crissum and under tail-coverts grayish or white with darker base. . . . . *annæ*.
  b'. Under tail-coverts not grayish or white.
    c. Middle of belly white and outer tail-feathers marked with white on inner webs (occupying the terminal third in adult males, sometimes rather faintly indicated in females or young).

d. Bill moderate. . . . . *hirundinacea*.
d'. Bill much thickened. . . . . *gnatho*.
c'. Middle of belly not white, and outer tail-feathers not always with white marks on the inner webs (never present in *elegantissima* or females of other species?).
d. Adult birds with crown blue and forehead chestnut; *young* without obvious chestnut on forehead and only faint indications of blue on crown. . . *elegantissima*.
d'. Crown not blue.
e. Males with shining blue-black throat. Females, forehead chestnut and middle of belly tawny ochraceous. . . . . *gracilis*.
e'. Males, throat and entire under parts yellow Females without tawny ochraceous on belly or chestnut forehead. . . . . *laniirostris*.

43. **Euphonia elegantissima.**—In the immediate vicinity of San José I have taken only a single example, but a short distance out they are a not uncommon resident.

An abnormally colored adult female in the Museum collection has the upper parts and sides of head dusky greenish olive-gray; the top of head, forehead, chin and throat are normal, the rest of the lower parts are bluish gray, whitish in middle of belly.

Euphonia affinis. — I have never taken examples here in the wild state, but they are frequently brought to the San José market.

Euphonia annæ.—Not taken at San José, but frequently seen in cages.

44. **Euphonia luteicapilla.**—A rather rare bird about San José.

Young males are indistinguishable from the females. As the bird grows older the characters of the male begin to show themselves in black in the loral region and a yellowish shading on the forehead and sides of the crown. Then a few scattering black feathers appear in the throat, and lastly the breast begins to assume an orange tint. Fully adult plumage is not attained, I think, until the second year.

45. **Euphonia gracilis.**—I took an adult male Dec. 30, 1890. The bird was in full song, and the plumage showed no signs of having been in a cage. However, the home of this species is on the southwest Pacific coast. For further observations on this species see Proc. U. S. Nat. Mus., Vol. XIV, p. 530.

46. **Euphonia hirundinacea.**—A rare bird about San José, but of rather wide distribution in the country, chiefly on the Pacific side from the coast to an altitude of about 7000 feet. They are frequently seen in cages at San José. Young males resemble females. The transition to adult plumage seems to be accomplished very slowly.

Sr. Don Anastasio Alfaro who has had frequent opportunities for observing the nesting of this bird gives me the following interesting note. The nest is constructed in a hole in the ground, frequently the bank of some stream or by the roadside where the grading of the road has left

banks suitable for the excavations which are always some distance from any habitation, the bird being quite shy. Senor Alfaro is not entirely sure whether the *Euphonia* makes its own excavations or uses deserted holes of the Rough-winged Swallow (*Stelgidopteryx serripennis*). The hole ordinarily is about a foot in depth. The nest proper consists of a few small twigs lined with soft dry grass. The eggs are ovate in form; white, thickly speckled in a ring about the larger end with light walnut brown and over this some larger spots of seal brown. In two of the five eggs before me, collected May 4, 1888, the walnut-brown color covers uniformly the entire larger end of the eggs and there are seal-brown spots above this. In two of the remaining three eggs there is a distinct band about the larger end. In the last egg the band is broken, the white ground color being quite apparent. The five eggs measure as follows: .69×.50; .70×.48; .71×.51; .72×.50 and .73×.51 inch.

47. **Euphonia minuta.**—Not uncommon about San José, especially during the latter part of the rainy season from September until November.

48. **Tanagra cana.**—A very abundant resident. Gregarious. Feeding chiefly on fruits. Usually a rather silent bird, and if it has any song I have never heard it. Breeds abundantly, but while I have taken many young I have not been fortunate enough to secure a set of eggs. The young differ from the adult only in softer, duller plumage.

49. **Piranga leucoptera.**—A rare resident species.

50. **Piranga rubra.**—Met with sparingly from the beginning of October —first noted in the fall of 1890 on Oct. 7—until about January 10; this is about San José. Down near the coasts they are not uncommon until as late as the second week in March.

In a series of forty-three birds there are only seven males in adult plumage; the remainder are females and young males, many of the latter in mixed plumage.

51. **Piranga bidentata.**—A resident, but not common. Young males resemble the adult female, and I am inclined to think that the adult male plumage is not assumed until the beginning of the second year. Birds in mixed plumage are taken only in the spring during the breeding season, while young males in the dress of the female are met with for fully nine months of the year.

52. **Buarremon gutturalis.**—Resident, but except at the beginning of the breeding season (the first of May) very shy and retiring in its habits. Feeding chiefly on the ground, at the first approach of danger they dart into the hedgerows at the sides of the lanes and are out of sight. If the bird has any song I do not remember having heard it.

This species breeds abundantly about San José. It is often compelled to act as foster parent to the Bronzed Cowbird (*Callothrus robustus*), its nests seeming to be especially attractive to this bird. The first nest I found of this species was on May 12, 1889. On that date it contained three eggs. On the 17th there were four eggs in the nest and one on the outer rim, the last two eggs being those of the Cowbird. The eggs of *B. gutturalis* are ovate in form; before being blown they appeared perfectly

white; after the contents were removed they had a very pale bluish shade. The eggs of the Cowbird are larger and much darker, varying between pale blue and pea-green. Incubation in the eggs of *B. gutturalis* was far advanced, one of the eggs being broken in removing the contents. The two remaining eggs measure .67×.90 and .64×.88 inch. The Cowbird eggs were perfectly fresh; they measured .75×.94 and .75×.86. The larger is ovate in form, and the smaller rounded ovate. The nest was placed in an upright fork of a small coffee tree, about seven feet from the ground, and was not well concealed. Outwardly it is constructed of coarse, dry grass stems, and it is lined with a little soft, fine, dry grass. It measures: outside diameter 4.75, depth 2.50 inches; inside diameter 2.50, depth 1.75 inches. I almost placed my hand on the female before she left the nest. She made no fuss, flying quietly into the low bushes near by and disappearing.

A second nest was taken June 2, 1889, containing five eggs, three of the Cowbird. The eggs of *B. gutturalis* were fresh; one of the Cowbird eggs was much incubated, the other two fresh. The *B. gutturalis* eggs measure .90×.65 and .91×.65; one is marked with a few small specks of chestnut. The nest measures 2.75 inches in inside diameter by 1.75 in depth; outside diameter, 7.00×5.00, depth 4.00 inches. It is rather large and bulky and was built in the tops of some bushes where it was not well supported. The outside consists of rough dry grass stems; within this are smaller plant fibres and grass blades and a lining of very fine, dry grass and horse-hairs.

A third nest, taken June 11, 1889, contained three fresh eggs. The nest was rather peculiarly situated, being placed about four feet from the ground, against the trunk of a large tree, in the hollow formed by the branching of a parasitic plant that clung to the bark, and was most excellently concealed by leaves, and by far the neatest and most compact nest of the species I have seen. The three eggs measure .67×.91, .65×.89, and .66×.90 inch. A week before, in the bushes only a few feet from this nest, I took an abandoned nest containing one Cowbird's egg.

I took the last nest in 1889 on June 20. It contained two eggs of *B. gutturalis* and one of the Cowbird; all were fresh. The eggs of *B. gutturalis*, as usual, were white before being blown, and a very pale bluish after the contents had been removed. The eggs are ovate, measuring .95×.68 and .96×.68 inch. The Cowbird's egg measures .93×.73 inch, and in shape is a short ovate. The nest is roughly constructed, the materials used being much coarser than usual. Measurements: outside diameters 5.50×6.00, depth 2.75 inches; inside diameter 2.38, depth 1.50 inches. The bird was not once seen nor heard. June 22 I shot a female with a half-formed egg in the oviduct. After this date all the specimens I secured indicated, by the ovaries, that the nesting season was passed. At this same time the birds became very shy, usually keeping themselves hidden in the low, tangled hedges.

Young birds have a slightly olive shading on the back. The white crown stripe is only indicated by a few grayish white feathers. The throat

is a paler yellow than in the adult. The breast and abdomen are washed with yellowish olive, and the feathers of the breast have dusky blackish shaft-lines.

53. **Saltator magnoides.**—This bird is widely distributed throughout Costa Rica; it is found on both coasts and up to an elevation of 6000 feet. It is resident at San José, where for about five months in the year it is one of the most pleasing songsters of the early morning. Young birds are not as bright olive above as the adult; the superciliary stripe is only faintly indicated and of a pale yellowish color. There is a narrow ashy whitish stripe on chin and upper throat; the sides of throat and breast are dusky blackish. The cinereous of the belly is variegated with blackish and on the crissum the feathers are faintly barred with pale yellowish olive and dusky.

54. **Saltator grandis.**—This is much more abundant about San José than the preceding species, but is not found at as low an altitude. In the series of forty specimens in the museum collection none were taken lower than 3000 feet, and none above 7000 feet. As is the case with its congener, *S. grandis* has a loud, clear, and very pleasing song that is to be heard almost every morning for half the year. Both the male and female sing.

The nesting season commences about the first of May, for I have taken fully fledged young by the middle of June. A nest taken May 10, 1889, was placed about twelve feet from the ground between some upright forks of a small tree at the side of a lane. It was rather loosely constructed of dry grass and other plant stems. The outside was quite rough in appearance with many straggling pieces. The nest measures inside: diameter 2.75, depth 1.75 inches; outside diameter 6.00, depth 4.00 inches. The nest contained two slightly incubated eggs. They are light Nile-blue in color, marked, chiefly in a ring about the larger end, with spots and irregular lines and scratches of black. The eggs measure 1.07×.75 and 1.04×.75 inch. The female, as soon as one approached the nest, would glide quietly away, and not return until all danger had passed. I did not once see the male near the nest.

Young birds are rich olive-green above. The superciliary stripe, spot on lower eyelid, bend of wing and under wing-coverts are pale yellow; chin and throat pale yellowish white; upper breast and sides olive-green; lower part of breast and belly olive, much suffused with buffy; crissum and under tail-coverts as in the adult.

55. **Habia ludoviciana.**—Rare. I have never seen a specimen taken here in the plumage of the adult male.

56. **Sporophila moreleti.**—Common resident. This species, I believe, is never found on the Atlantic side of the mountains, but on the Pacific side down to the coast. Although it breeds abundantly about San José I have not found either the nest or eggs. This species is prized very highly as a cage bird, the song being low and sweet, and not without variations.

57. **Volatinia splendens.**—Common resident. Not found on the Atlantic side of the mountainous interior.

(*To be continued.*)

A FURTHER REVIEW OF THE AVIAN FAUNA OF CHESTER COUNTY, SOUTH CAROLINA.

BY LEVERETT M. LOOMIS.

(*Continued from Vol. VIII, p. 173.*)

OBSERVATIONS ON MIGRATIONS.*

December and January.— The migrations may scarcely be said ever to be at a complete standstill in this region. Every month of the year witnesses migratory movements. In December and January both northward and southward movements are alternately manifested, each in turn obtaining the supremacy. Toward the close of the latter month, if the season be favorable, the former movement gains the ascendency, setting more steadily northward. Temperature appears to be a controlling influence at this time of the year. Cold waves increase and warm ones diminish the abundance of some birds, especially those that winter chiefly further north — the Prairie Horned Lark for example.† Snow renders some birds particularly plentiful, others scarce; the American Pipit being entirely driven away by it. With the uncovering of the ground, however, it immediately reappears. After mild weather it sometimes happens that the Pipit, in its movements southward, waxes in numbers with cold, the severe waves sending birds from further north, yet not driving the majority south of us. The exceptional mildness of December, 1889, accelerated the progress northward. Birds that ordinarily winter rather sparingly in the Upper Country, and more abundantly in the Lower, gradually appeared in larger numbers, the Mockingbird and Pine Warbler being notable instances. The Grasshopper Sparrow also made its appearance, and some of the common birds of winter became less numerous, the Red-tailed Hawk almost wholly disappearing. In January there were feeble movements from the north during cool spells, but there was no perceptible diminution in the birds that had advanced from the

*Read at the Ninth Congress of the American Ornithologists' Union, Nov. 18, 1891.

†The previous portions of this article should be consulted where examples are cited without statement of detail.

region below. After the intervals of inclemency their numbers further increased, the Pine Warbler becoming decidedly abundant. In neither month was the Palm Warbler met with, it apparently being less susceptible to the milder influences of temperature than its congener.

The presence or absence of birds in winter cannot be explained wholly on the score of migration brought about by cold or warmth. Irrespective of these conditions, one season a particular species may be plentiful in a restricted locality, while the next it may be but poorly represented there, or even entirely wanting. Bewick's Wren well exemplifies this. A similar shifting of abode has been observed in the Purple Finch, Towhee, Brown Creeper, and others. The peculiar case of the Red-headed Woodpecker also bears upon this point. This transposition of habitat may be accounted for in part on the ground that there exists among certain species a tendency to aggregate around local centres (the contiguous territory at the time being thinly inhabited or even totally depopulated), and that these centres shift with different years. Why a locality is selected or rejected is not obvious. Birds must occupy some part of the region constituting their winter habitat, must be somewhere, and, if the conditions were alike, the choice of a particular location might be largely arbitrary. It falls within the bounds of possibility that a mere desire for change of scene, as among human beings, may have some weight in determining the selection of a winter home. On the other hand there may be causes that have escaped our discernment, which if understood, would account for much that now seems in a measure mysterious. The question of food is an all important one, but when a locality has been forsaken by any of the species mentioned there has been no visible deficiency in the food supply. The disposition, without apparent reason, to shun certain localities, save during migratory movements, further accounts for the absence of birds.

For about a week during the early part of January, 1887, the whole country, hereabouts, was suddenly flooded with Robins. They were as abundant as during the height of their northward migration. The occurrence was so unusual as to excite general remark that the Robins had come a month ahead of time. Their appearance was coincident with snow and a severe turn in the weather. With the advent of a milder season they disappeared,

At the usual time the regular migration northward took place. Their presence in the first instance finds solution, I think, in the shifting of a local centre above us, the boreal weather driving the birds southward, the pleasant weather enticing them northward again. The army of regular migrants that came later were evidently those that wintered farther south. The movement of Bewick's Wrens at the close of December, 1889, may be imputed to migration northward of the birds of some local centre of abundance not far removed, the long-continued clemency bringing it about. It is assumed, as a general principle, if birds appear abruptly in the depth of winter and then again in the flush of migration, that their first coming is due to local shifting, from the north if cold, from the south if warm.

During the hard winter of 1886-87 there were great inroads of Red-tailed Hawks; the mild winter of 1889-90, as previously stated, was notable for their scarcity. Their absence in the latter season is seemingly explained by the migration of local birds occasioned by warmth that was not sufficiently far-reaching to bring the breeders and later migrants from further south to fill their places.

When the centres of distribution are small, at the extremes of range or elsewhere, a retrograde or a forward movement would result in but a slight influx in the region immediately invaded. It further follows that when a locality does not lie within the path of a north-bound community, another point further north may be sooner reached, be sooner to have recorded from it, 'first appearance.'

February to the Middle of March.—Ordinarily it is not until February that the northward movement becomes conspicuously apparent. Many winter residents are then reënforced from the region below and the departure for the north truly begins. This month is also the usual time of the opening of the song period. Unless the season is backward, by the first week there are decided signs of migration. Robins become more noticeable and Red-winged Blackbirds are found with increasing regularity, and greater activity is displayed among the hordes of Sparrows. The Meadowlark, too, grows restless. The Flicker, Pine Warbler, Mockingbird, and others begin to increase in numbers and become more generally distributed. As the days pass, if the weather is not unfavorable, the movement from the south gains

steadily in strength, the middle of the month and the third week showing marked increase in many 'resident' and winter birds, as Wilson's Snipe, Vesper and Field Sparrows, Cardinal, etc. The hosts of Robins and Blackbirds also arrive, and females become more numerous in species represented in winter chiefly by males In forward seasons straggling Grasshopper Sparrows make their appearance. By the end of the month the flood tide of the Robin migration is reached. Other birds have been continually strengthened, and a few, as the Bluebird, have waned. The dates given are the approximate average, an open or backward season manifesting corresponding earlier or later ones. The fluctuations in abundance of winter birds, which arise from the passage of successive waves northward, begin to be apparent in this month. At this time of the year the cold is rarely ever of sufficient duration to cause pronounced movements from the north. A few Prairie Horned Larks, however, respond to the severer waves, and the advancing migrants are sometimes forced back, the scale of local abundance ascending somewhat as in a forward movement. A descent of temperature usually produces but little effect upon the birds that have come up from the region below, though protracted inclemency retards further advance.

During the first half of March the migration is chiefly a continuation of the movements of February. The birds that winter mainly below receive further accessions. Other winter residents decline, or exhibit variations in abundance as the waves roll northward, a considerable hiatus often existing between the different advances of a species. Cold sometimes checks the migration as in February, holding it in abeyance, but rarely, if ever, bringing about slight regurgitating movements.

Middle of March to the Middle of June.—With the coming of the Black-and-white Warbler, about the 15th of March or during the week following, begins the regular migration of birds that are never found in this locality in the winter. But a few days behind this Warbler arrive the first Blue-gray Gnatcatchers. Both usually become very numerous during the last portion of the month. Bachman's Sparrow, the Yellow-throated Warbler, Maryland Yellowthroat, White-eyed Vireo, Henslow's Sparrow, Bartramian Sandpiper, Parula Warbler, Yellow-throated Vireo, and Black-throated Green Warbler also make their appearance at the end of the month, about as in the order named. The last

three, however, are essentially April birds as to the time of their first arrival. Some of the constant winter visitors diminish greatly during the closing fortnight, successive waves characterizing their decline. The aftermath of the Robin migration, too, continues in a similar manner through this month. Other species, again, simply display fluctuations. Some of the irregular and uncommon birds, wintering chiefly in the region below, as the Brown Thrasher, now become prominent, unless delayed. The breeding season proper normally opens in this month, particularly during the last half of it.

The ordinary spasmodic returns at this time of the year to cooler temperature have not been found to exercise great influence upon the migrations, the birds usually being but little affected by such vicissitudes. When once under headway they stubbornly hold their ground. Prolonged inclemency, which is now exceptional, is more potent, however, impeding the movement during its prevalence. While the most forward seasons have been the mildest, it has not invariably been true that an open spring was accompanied by corresponding early migratory movements from the south. Other agencies, aside from local cold, have sometimes, apparently, arrested advance. The backward spring following the phenomenally mild winter of 1889-90, considered in connection with other years, showed that the later migrations, those of the Black-and-white Warbler, etc., are directly accelerated or retarded by the immediate meteorological conditions, and not by the remote ones. Late dates of first arrival, in individual species, are not to be accounted for solely, I believe, by phases of the weather, as is evidenced by the case of the Yellow-throated Warbler which varies considerably in its coming in different years when other early migrants are on time. Other causes, as a variation within narrow limits in the line pursued by the vanguard, may bring about these apparent delays. It may further be stated, in general, if the van of migration was held back immediately below a point, the territory nearest above might be passed over for the time being, and a locality further north be the first stopping place, and hence exhibit an earlier record.

The migrations gather force through April onward until about the first of May, or the first week of May, when the falling off commences. The winter birds (migrants really) now finally disappear; some, as the Slate-colored Junco, about the first or

second week of April, others, as the Hermit Thrush, after the middle of the month. A few linger well on into May, as the Savanna and White-throated Sparrows and the American Pipit. During April the Myrtle Warbler (an abundant winter resident) attains its greatest abundance, illustrating the increase, from the bulk below, of a species wintering here in numbers. The American Crow, a 'permanent resident,' does not altogether complete its migration until the early part of April, though its breeding season is well under way. The Robin migration closes about the middle of the month, straggling parties bringing up the rear. Summer birds continue to arrive, the majority of individuals in some species passing further north. Transients vanish and others take their places. In all waves are typically exemplified. From the foregoing it will be seen that 'winter residents,' migrants, and breeders overlap. The general dispersion of early breeding birds, and later ones as well, which occurs after the young are hatched, contemporaneously with the northward movement, is not to be ascribed, of course, to reënforcement through migration, either northward or southward, nor is their comparative scarcity during the interval of confinement to the vicinity of the nest to be attributed to the opposite cause, withdrawal from the locality.

After the first week of May the decline in the migrations becomes very evident. New arrivals ('firsts') cease to appear. The scale of abundance among most transitory visitants rapidly descends; in a few, however, as the Bobolink, the failing point is often not reached until about the 15th. With the progress of the month, wider and wider gaps occur between the waves, and by the first of June the rear guard consists only of stragglers. The young in most species are now hatched and many are abroad. By the middle of June the period of song in some birds begins to wane, and generative organs to deteriorate, and incipient bird gatherings to form, — all portending southward movement.

Middle of June to November.—The departure of adult birds of certain species, as the Black-and-white Warbler, at the close of their season of reproduction inaugurates the southward migration in this region.* The precise time when old birds leave

*It is not intended to impart the idea that the young, in varying numbers, do not, in some instances, accompany the adults.

varies. Those that have been hindered from any cause in bringing up young are later in starting than other representatives of the same species. Some species finish breeding early, and depart early, while others are tardy breeders or normally raise second broods. That second broods, however, are habitually reared by but comparatively few species in this vicinity, is my firm conviction. Of recent years my attention has been so largely fixed upon other lines of field work that I have not been able to devote the careful observation necessary to determine, even with approximate exactness, the time when the first stages of movement take place in each species breeding here. About the 20th of June, however, if not a little sooner in some years, appears to be the date of the inception of the migration.*

With July come the first Warblers that are not known to breed hereabouts, — the American Redstart, Worm-eating Warbler, Louisiana Water-thrush. All, however, rear their young near by in the mountains. It is worthy of note, that all these early comers, that I have taken, and others in August, have been birds-of-the-year. They were probably stragglers of short migration, the adults having previously passed over us in their southern flight. In evidence of this, it should be mentioned that at Mt. Pinnacle and Cæsar's Head the adults of the Louisiana Water-thrush disappeared about the middle of June. Furthermore, a number of common summer residents of the Southern Alleghanies pass in their migration southward without stopping in this locality, being rarely or never detected. Circumstances similar to this case of the prior occurrence of hornotines have very likely led to the belief, entertained by many, that the young precede the old in journeying southward.†

The migratory impulse is further manifested in July by the continued desertion of summer residents. Toward the end the

*In this connection note the arrival of Warblers in July at Key West, *Scott*, Auk, Vol. VII, pp. 16-22.

†From the very nature of the case it cannot be affirmed with certitude that the first arrivals at a given location (particularly one having a great stretch of territory to the northward) are the first birds that have migrated from any common starting point — the place of breeding. On the contrary, when adult birds have grown scarce in a locality and the young remain in force, and there have been no fluctuations in abundance indicating movement from above, and adults of the same species occur soon after in the region lying to the southward of the breeding range, it does seem to be proven that the young do not migrate earlier than their parents.

Orchard Oriole and Summer Tanager take their departure. The gathering of clans of Red-winged Blackbirds and their subsequent disappearance form one of the closing features of the month. Birds similar to the breeding ones, also, begin to appear from localities above as the month progresses. The Black-and-white Warbler, Parula Warbler, and Blue-gray Gnatcatcher are examples. The first song period draws rapidly to a close with July. In the study of the beginnings of the southward migration, the waning of the song season tends to convey an erroneous idea of rarity in many birds, owing to their diminished prominence, while on the other hand the formation of gatherings and the general distribution incline to create an impression of increased abundance. The inroads of birds of like kind to those that breed are also to be taken into account — migrants not being mistaken for denizens.

August, from the outset, is a month of extensive movements in this region. The waves of migration, and they are sharply defined, bring many species that have grown scarce, or varied in abundance, since their season of breeding was over. Some reappear in limited numbers, never reaching their previous prominence, as the Orchard Oriole, Summer Tanager, Prairie Warbler, etc. Others become more plentiful than they were before, as the Chuck-will's-widow, Whippoorwill, Loggerhead Shrike, Yellow-throated Vireo, Parula Warbler, Carolina Chickadee, Blue-gray Gnatcatcher, etc. In all intervals of paucity are conspicuous. In certain birds, as the Yellow-throated Warbler, there is a period of absence, more or less marked, between the going of the breeders and the coming of the migrants. The Ovenbird, Cerulean Warbler, Blackburnian Warbler, Chestnut-sided Warbler, Golden-winged Warbler, and Bobolink arrive — the first three in the early part of the month. All occur intermittently and, with the exception of the Ovenbird, Chestnut-sided Warbler, and Bobolink, very sparingly. Wilson's Thrush has been taken in two instances during the last week of this month. Of July birds, the American Redstart and Worm-eating Warbler are at times fairly numerous, the former especially. From the study of the after movements it seems safe to say that the August migrants are from territory not far distant. Reproduction here practically ceases with August. It is only the few tardy species and second breeders that protract it even to this length.

With August, likewise, essentially terminates the season of first song, — the singing of the last of the summer residents coming to an end. Before the conclusion of the first season, the second begins in the efforts of the young and the returning migrants, summer species. The opening of this second period is typically illustrated in the Mockingbird about September 1, or a little later. A great influx of this species takes place during August. From the first or second week onward they swarm the hedgerows, plum thickets, and roadsides. The late breeders — Blue Grosbeak, etc. — commence to depart at the termination of this month. About September 1, the Blue-gray Gnatcatcher passes the point of culmination. It tarries on, however, nearly or quite to the end of the month.

Through September the tide of migration continues to rise, the high-water mark being reached about the first week of October. 'Resident' and summer species alternately wax and wane with the swell and fall of the current. Most of the latter decrease before the close of the month, as the Red-eyed Vireo. Some, as the Orchard Oriole, altogether cease to appear. Of the former, many grow more numerous, as the Flicker and Bewick's Wren. Among the purely transients, August arrivals are in the ascendency, waves following waves in frequent succession. Some of these earlier birds of passage now gain their maximum abundance, as the Chestnut-sided Warbler and American Redstart. The new ones come mainly after the first week, in most cases attaining extreme numbers in October, as the Black-throated Blue, Black-throated Green, and Palm Warblers. The appearance of the Savanna Sparrow, well to the close of September announces the coming of winter birds. Belated broods and migrants of the same species sometimes overlap. An instance of this sort is recalled in the Blue Grosbeak. A family of young, unsteady of wing, under the care of the mother bird was observed September 4, 1888. The day before a party of migrants were seen, — adjudged migrants because of the time of year and their manner of behavior. They flew high in air, coming from the northward, and alighted in a body on the summit of a giant pine, blasted and weathered. Their whole mien and conduct were entirely at variance with summer demeanor.

A striking feature in the southward migration in this region is the collection of the woodland birds into gatherings led by Tufted

Titmice and Carolina Chickadees.* In a typical gathering there will be associated with a band of these birds a few White-breasted Nuthatches, one or more Downy Woodpeckers, and a multitude of Warblers, Vireos, etc. On different days, these gatherings vary in aspect, species temporarily predominant giving to each a distinctive character. Thus, July 31, 1888, the Blue-gray Gnatcatcher was the prevailing bird; August 8, the Parula Warbler; September 11, the Blackburnian Warbler. The last, also, was the characteristic bird September 24 of the previous year. Examples of this sort might be cited indefinitely. So constant are these gatherings, that when they have not been detected — a considerable tract of territory being traversed and groups of Titmice and Chickadees found — it has been regarded proof that no movement of importance of woodland birds has taken place.† In spring these assemblages are prominent at the outset, but usually after the first of April the migrants form oases, or islands, in the woods rather than compact bodies moving synchronously.

The ebbing of the southward migration begins soon after the first week of October. It is more gradual than the decline in the opposite movement, bearing closer resemblance to that movement at its commencement. The last of the strictly summer species finally withdraw. Several, as the Red-eyed Vireo, loiter on toward the end of the month. Transients as first arrivals are replaced from the start almost exclusively by species that reside during the winter, the Yellow-bellied Sapsucker, Song Sparrow, Myrtle Warbler, and American Pipit being examples. At the middle of the month, unless their departure has been hastened, the Parula, Black-throated Blue, Blackpoll, and Black-throated Green Warblers are present in force. Through the third week there are still quite a number of typical migrants remaining, some of them continuing fairly numerous. The last week is one only of stragglers, as the Blue-headed Vireo, Cape May Warbler,

*The subject of bird gatherings in the migrations will be considered at greater length in a subsequent paper.

†This statement, or any former one implying oscillatory movement, is not in any sense to be construed as conflicting with the theory of a continuous current of migration setting steadily southward; the phenomena described being simply local manifestations. A simile is perhaps found in a vast army of Crows on their way to roost, great flocks being connected by straggling columns in one unbroken array.

Black-throated Blue Warbler, Blackpoll Warbler, Black-throated Green Warbler. During the last half of the month, all the regular winter sojourners are represented (the Prairie Horned Lark and a few others perhaps excepted) — some by large numbers, as the Song Sparrow and Golden-crowned Kinglet. The Flicker, toward the middle of the month, and the Ruby-crowned Kinglet, at the close, exemplify the diminution, in its beginning, of 'resident' and winter birds most abundant as migrants.

The Parula Warbler serves well as a type of the whole southward movement. As a breeder it is only tolerably common. In July it begins to grow more numerous. Increasing through August, it finally attains its greatest numbers in September and early October. During all these months fluctuations are constant, and they may well be supposed to indicate waves of migration; each rise in the scale of abundance signifying arrival of birds from territory farther and farther north, and each fall, departure for the south. Among strictly transient species the migration is epitomized, likewise, in the Blackburnian Warbler, its sojourn having extended from August 8 to October 22. The appearance of the Red-breasted Nuthatch — a summer dweller in the higher mountains of North Carolina — at the end of September seems to throw additional light upon the source from which the later and earlier migrants are drawn. The Wood Thrush during the last days of September and first part of October furnishes a striking instance of the reappearance of birds after a well-defined period of absence, the intervening gap being accounted for by the passing over of the inhabitants of the nearer localities. The oscillations of the earlier season continue to the close of the migration.

November.—What February and the first half of March are to the northward movement, November is to the southward. The opening fortnight witnesses the full tide of Blackbirds, the Red-winged returning after a long void but imperfectly broken since the breeding season. The Meadowlark reaches its height and wanes, and most other winter birds come to their complete measure of abundance. About the 15th the topmost wave of this closing migration recedes, and the subsidence to winter numbers takes place, and the refugees from the northern blasts appear, and, at last, the contest of movements begins anew. In November, too, occur loiterers, chiefly species wintering not far below,

as the Grasshopper and Henslow's Sparrows, Blue-headed Vireo, etc. Prolonged warmth holds some birds here and further north in abundance greater than is usual. The effect of temperature is illustrated in the Mockingbird. At the beginning of October, 1889, they were abundant, but a sharp turn and heavy frost drove all but winter numbers southward before the week was over. The year before, when exceptionally mild, they had not reached this basis on the 24th, although diminished by a cool wave and slight frost that came September 30. It appears to be true that an early cool spell is more potential with certain species than subsequent protracted mildness — the bulk retiring before the chill instead of tiding it over. The genial weather later, however, may encourage other species coming from further north to remain in larger numbers than they would if it were ordinarily cold.

(*To be continued.*)

A PRELIMINARY LIST OF THE BIRDS OF THE GRAY'S HARBOR REGION, WASHINGTON.

BY R. H. LAWRENCE.

GRAY'S HARBOR lies on the Pacific Ocean in the extreme western part of Chehalis County, Washington, about forty miles north of the mouth of the Columbia River. It is the most northern of the few safe and large harbors between San Francisco and the Straits of Fuca. The harbor drains a large area, is bordered by much marshy land, and, being large and mostly shallow, shows when the tide is low a vast expanse of mud-flats cleanly cut by the two main channels — the north and the south. These channels separate inside the bar and run eastward till they join again near Aberdeen. The harbor is about sixteen miles long east and west, by twelve north and south at its western end, narrowing much toward its eastern end. It is protected from the sea by two long, narrow, sandy points, Point Brown on the north and Point Chehalis on the south. Its largest river, the Chehalis, rises in the Cascade Mountains near Mount Rainier, and is navigable by steamers for twenty miles or more. The Humptulips,

next in size, rises in the Olympic Mountains, flows southwest fifty or sixty miles, and empties into its northwest side. This stream is shallow, rapid, broad, and very clear; it is not navigable by steamers, excepting small ones for three miles. Canoes are poled up-stream for thirty miles. All the harbor streams have much marsh land about their mouths. The whole country back of this low land is hilly and is densely covered with a heavy growth of large timber — fir, hemlock, spruce, and cedar. The firs and spruces grow to be giants: it is usual to see them from four to seven feet in diameter, and over two hundred feet high. Underneath these great trees is generally a thick growth of vine-maple, hemlock, large and small, alder, etc., the ground being a network of ferns, vines, bushes, and brush, with fallen giant trees here and there in all stages of decay. On all this much moss grows; and long festoons hang from the branches of the standing trees. Except in the few dry weeks of midsummer, the bushes and ferns are generally wet. With one's face spattered with raindrops and cobwebs, and with an unsure footing, it is no wonder progress is slow through such a tangle. There are a few scattered prairies or 'opens' north of the harbor, mostly of poor soil covered with a large growth of ferns. Stevens Prairie is the largest and most grassy. Three towns are on the harbor: Aberdeen at the junction of the Wishkah and Chehalis Rivers; Hoquiam on the Hoquiam River, four miles farther west; and Ocosta on the opposite (southwest) side between the Johns and Elk Rivers. The only industry is the manufacture of lumber.

In April, 1890, I first visited this section, for a few days, going just beyond the present site of Ocosta. Afterwards a few more hurried trips were taken; and one in May was extended to Stevens Prairie, a natural prairie lying along the north side of the Humptulips River for two miles, and reaching back for a mile to Stevens Creek, which borders it on the north. Humptulips is situated on the prairie. Flowers blossom there plentifully, and in the river-bottoms, the soil being very rich, is a great growth of underwoods with large cottonwoods, alders, and maples, and a scattering of giant spruces. Humptulips is about twenty-four miles northward of Hoquiam by the county road. From the first part of June to the first part of October, 1890, and again from about the middle of December, 1890, to July, 1891, I was in the county, and most of my time was spent on the East Humptulips

River, in a very rough and densely wooded region, some ten miles northeast of Stevens Prairie. Occasional trips were taken to the harbor, and in June, 1891, one long tramp of five days to Quiniault Lake, a lovely sheet of water lying eighteen miles north from Stevens Prairie. Until April but little chance was had to study the bird life. The winters are generally mild at Humptulips, though there are many frosty nights in summer. There is a great rainfall from late autumn to well into the spring; perhaps nearly one hundred inches of rain fall yearly. What snow falls usually melts in a few days, except on the high ridges. The summers are generally dry and fine from late June to September.

To Dr. J. A. Allen many thanks are due for much assistance in determining species and for courtesy shown.

Æchmophorus occidentalis. WESTERN GREBE. — Winter resident? Occasional? Have seen a mounted specimen, shot on the harbor about February.

Urinator imber. LOON. — Winter resident? A skin examined of one shot on the harbor in March.

Lunda cirrhata. TUFTED PUFFIN. — Accidental. Rare at this point on the coast. I have examined a mounted specimen and a skin of birds secured on the south and north sides of the harbor after a great storm, or series of storms, about December 25, 1890, when a large number of the bodies of these birds were driven on to the beach. About thirty were seen by Mr. S. A. Wye below Peterson's Point (Point Chehalis), and perhaps as many above Point Brown — one of these birds was alive.

Larus glaucescens. GLAUCOUS-WINGED GULL. — Winter resident. Very common about tide-water from fall until late spring. During the salmon runs in fall and winter, when so many hundreds of these fish are at times rotting along certain branches of the Humptulips, and far up the river, these birds fly often thirty miles or more up-stream to feed upon them, returning at evening to the harbor.

Larus occidentalis. WESTERN GULL. — Winter resident. Very common on tide-water, and I think in greater numbers than any other Gull. Habits similar to *L. glaucescens.*

Larus philadelphia. BONAPARTE'S GULL. — Winter resident. Habits similar to those of the two above. In numbers not so plentiful. Large flocks reported seen on Quiniault Lake in April.

Merganser americanus. AMERICAN MERGANSER. — Resident. Common on the Humptulips, where they breed.

Anas boschas. MALLARD. — Resident? Common during migrations. A few are said to breed on the Humptulips and Upper Quiniault Rivers, but I am not yet quite positive of this.

Anas strepera. GADWALL. — Migrant? Two seen May 17, near Hoquiam, flying at a distance.

Anas americana. BALDPATE. — Migrant? Not common. A mounted bird seen, shot on the harbor about March.

Aix sponsa. WOOD DUCK. — Resident? Not common. A few seen on the Chehalis River May 12. A few said to winter about the harbor.

Aythya vallisneria. CANVASBACK. — Migrant. Fairly common on the harbor during migrations.

Aythya marila nearctica. AMERICAN SCAUP DUCK. — Winter resident? Pretty common.

Aythya affinis. LESSER SCAUP DUCK. — Winter resident? Common. In greater number than *A. m. nearctica*. Habits similar. One shot May 11.

Glaucionetta islandica. BARROW'S GOLDENEYE. — Winter resident. Not common? A mounted specimen seen, shot on the harbor in February.

Charitonetta albeola. BUFFLEHEAD. — Winter resident. Not very common. A mounted specimen seen, shot on the harbor in February.

Oidemia perspicillata. SURF SCOTER. — Winter resident. Pretty common. Frequents the ocean—the saltier—side of the harbor.

Erismatura rubida RUDDY DUCK. — Resident? Saw two Ducks on Quiniault Lake, June 14, at a distance, which I felt sure were this species. They were very wild.

Branta canadensis. CANADA GOOSE. — Migrant. Common on the harbor tide-flats during the migration, in large flocks, and with other species. One seen on the East Hoquiam River May 21.

Branta nigricans. BLACK BRANT. — Migrant. Fairly common on the harbor during migration. A flock seen flying south August 30, 1890, near Axford Prairie, four miles south of Humptulips.

? Olor columbianus. WHISTLING SWAN. Migrant. Rather rare. Two Swans were shot this year on the harbor by boatmen; one April 18, out of a flock of seven or eight. A flock of about twenty was reported by a settler as passing over Humptulips about April 10.

Botaurus lentiginosus. AMERICAN BITTERN. — Resident? Not common. Several seen near Ocosta April 3, 4, and 5, 1890.

Ardea herodias. GREAT BLUE HERON. — Resident? Rather common. Several seen near Ocosta April 3, 4, and 5, 1890, and after. Seen on the lower Humptulips; also one on Quiniault Lake June 14.

? Nycticorax nycticorax nævius. BLACK-CROWNED NIGHT HERON. — A Heron, which was taken for this one, flew up as our canoe approached the east shore of Quiniault Lake, June 12.

Grus mexicana. SANDHILL CRANE. — Migrant. Fairly common on the harbor during migrations. A flock of eighteen or twenty seen April 20, near the head of tide-water on the Hoquiam River, flying north.

Gallinago delicata. WILSON'S SNIPE. — Migrant? On the evening of April 2, 1890, I picked up one which was injured, on the street in Aberdeen. They often fly very low over the harbor towns, in the gloaming. I saw a large flock near Hoquiam on March 8, 1891.

Tringa alpina pacifica. RED-BACKED SANDPIPER. — Migrant. Common. Many flocks of six to twenty were seen on the north shore of the harbor May 11. Also sparingly associated with *Ereunetes occidentalis*.

Ereunetes occidentalis. WESTERN SANDPIPER. — Summer resident? Very common. Many large flocks were seen May 11 on the north shore of the harbor; in them were almost invariably a few *T. a. pacifica*. Flocks of Sandpipers, taken to be *E. occidentalis*, were seen on the harbor July 4.

Actitis macularia. SPOTTED SANDPIPER. — Summer resident. Very common during migrations. Some breed on the Humptulips River.

Numenius hudsonicus. HUDSONIAN CURLEW. — Winter resident? Large flocks seen April 19 at a distance on the 'flats' at Hoquiam.

? Callipepla californica. CALIFORNIA PARTRIDGE. — Resident. From stock introduced in the fall of 1889 by a settler living on the Humptulips near Stevens Prairie. Flocks of young birds seen in the summer of 1890 and in May, 1891, by settlers at Stevens and Axford prairies. Descriptions not clear; may be *Oreortyx pictus*.

Dendragapus obscurus fuliginosus. SOOTY GROUSE. — Resident. Common. Oftener heard booming from some tall spruce or fir than seen. In winter rarely seen, as it lives in the tree tops two hundred feet above ground.

Bonasa umbellus sabini. OREGON RUFFED GROUSE. — Resident. Common. More plentiful than *D. o. fuliginosus*. Most plentiful in the river-bottoms and more open places in the woods, unlike *fuliginosus* which loves to haunt the large timber.

Columba fasciata. BAND-TAILED PIGEON. — Summer resident. Common in the larger river-bottoms where cottonwoods, alders, and other soft woods grow, and berries abound.

Aquila chrysaëtos. GOLDEN EAGLE. — Resident. Rare. One was seen May 10 perched in a tall spruce on the bank of the lower Humptulips.

Haliæetus leucocephalus. BALD EAGLE. — Resident. Rather common on the harbor, and occasionally seen on the Humptulips. A pair, evidently breeding, observed at Quiniault Lake June 12.

Falco columbarius. PIGEON HAWK. — Resident. Not common. One flew very close to me, May 22, near the Hoquiam River. A few seen elsewhere and on the Humptulips.

Falco sparverius. AMERICAN SPARROW HAWK. — Resident. Pretty common. One seen August 13, 1890, on the East Humptulips. Small Hawks now and again seen there, at Stevens Prairie, and on Gray's Harbor, some of which were noted as this bird, others probably being *Accipiter velox*.

Pandion haliaëtus carolinensis. AMERICAN OSPREY.—Resident? One seen April 12, catching fish near the mouth of the Humptulips. Near the same place saw two, May 11, evidently breeding there.

? Strix pratincola. AMERICAN BARN OWL. — Resident. This Owl was seen twice in February near the East Humptulips by a neighbor who de-

scribed it to me pretty clearly. The bird seemed to be attracted by the carcass of a small striped skunk.

Scotiaptex cinerea. GREAT GRAY OWL. — A skin examined of one shot near Ocosta in May.

Nyctala acadica. SAWWHET OWL. — Resident. Reported by settlers who had heard and seen it on the lower Humptulips in March and April, 1891. It frequented then an overflowed bottom.

Glaucidium gnoma californicum. CALIFORNIA PYGMY OWL. — Resident. One shot on the East Humptulips September 2, 1890; another seen at same place January 22.

Coccyzus americanus occidentalis. CALIFORNIAN CUCKOO. Summer resident. Uncommon. I heard one near the East Humptulips River September 15, 1890, and at the same place saw and heard one high up in a dead fir a few days later — September 27. The man who was then with me reported hearing one on the Wishkah River in June, 1891.

Ceryle alcyon. BELTED KINGFISHER. — Resident. Very common on the lower parts of the harbor streams; fairly common on their upper waters and on the Quiniault River.

Dryobates villosus harrisii. HARRIS'S WOODPECKER. — Resident. Common everywhere.

Colaptes cafer RED-SHAFTED FLICKER. — Resident. Pretty common on the occasional grassy prairies along the Humptulips and on the scantily wooded salt marshes about its mouth.

Trochilus rufus. RUFOUS HUMMINGBIRD. — Summer resident. Very common on Stevens Prairie, and common on the Humptulips River bottoms where salmon-berry and other flowering bushes grow. First seen in 1891, April 12, near James's Rock on the north side of the harbor.

Trochilus alleni. ALLEN'S HUMMINGBIRD. — Summer resident. Perhaps as common as *T. rufus*, and frequenting similar places. First noted in 1891 on the East Humptulips, April 30. I had a good view of one on Quiniault Lake June 13.

Trochilus calliope. CALLIOPE HUMMINGBIRD. — Summer resident. As common perhaps as *T. rufus*. First seen in 1891 on Stevens Prairie, April 22. The Hummers are very plentiful in this region, and are found in abundance on Stevens Prairie where the conditions are very favorable for breeding, the prairie being bounded north and south by two streams, Stevens Creek and the Humptulips River, whose fertile bottoms have quite a growth of salmon-berry and other bushes. The prairie produces many kinds of flowers and berries. No specimens of Hummers were secured.

Contopus richardsonii. WESTERN WOOD PEWEE. — Summer resident. One shot June 3 on Stevens Prairie. Heard occasionally there and on the Humptulips; also at Quiniault Lake, June 14.

Empidonax difficilis. WESTERN FLYCATCHER. — Summer resident. One of the commonest, if not the commonest, of the Flycatchers here.

Empidonax pusillus. LITTLE FLYCATCHER. — Summer resident. Rare. One seen August 21, 1890, and another May 25, 1891.

Otocoris alpestris strigata. STREAKED HORNED LARK. — Resident? A pair, seen June 12 on the Upper Quiniault River by my companion, came to our camp at a small clearing on the river bank. One reported by a settler on the Lake as seen several times in April. My companion also described a pair which lived from April to June near his house in the woods four miles north of Humptulips; the forest there was broken by open beaver marshes.

Cyanocitta stelleri. STELLER'S JAY. — Resident. Common on the water courses, and in the clearings; in the forests largely replaced by *P. obscurus*. Very suspicious and alert.

Perisoreus obscurus. OREGON JAY. — Resident. Common in the heavy timber; not often seen in the opener places. An unsuspicious and rather silent bird.

Corvus corax sinuatus. AMERICAN RAVEN. — Resident. Fairly common in the thicker timber; probably would be so in the opener places, but *C. caurinus* makes war on it. Sometimes not seen for days, then a flock may be located by the noise it makes over some elk's or deer's carcass.

Corvus caurinus. NORTHWEST CROW. — Resident. Very common on the lower Humptulips and the harbor tide-flats; common on the upper river. With the Gulls they are good scavangers when salmon are running in fall and winter.

Agelaius gubernator. BICOLORED BLACKBIRD. — Winter resident? I saw a few at Hoquiam March 8. I think they stay on the harbor all winter.

Scolecophagus cyanocephalus. BREWER'S BLACKBIRD. — Resident? Pretty common on the harbor; a few winter there, I believe. Saw one at Stevens Prairie May 3.

Loxia curvirostra minor. AMERICAN CROSSBILL. — Resident. Common. Gregarious. Oftener heard chipping in the high tree tops, than seen. Confined mostly to the thick and tall timber. Generally seen in flocks of six to ten. Near the Hoquiam River on December 13 I saw a great flock of two or three hundred perched high in two tall dead trees.

Ammodramus sandwichensis alaudinus. WESTERN SAVANNA SPARROW. — Summer resident. Common on the harbor about Hoquiam and on Stevens Prairie where they breed. This bird may be typical *sandwichensis*, but the measurements of a skin I have seem too small.

Zonotrichia leucophrys intermedia. INTERMEDIATE SPARROW. — Resident. Very common on Stevens Prairie and on the harbor, where they breed. First noted in 1891 on Stevens Prairie April 12. Some probably winter there. A sweet songster.

Junco hyemalis oregonus. OREGON JUNCO. — Resident. Not as common as *Z. l. intermedia* or *M. f. guttata*, but fairly common.

Melospiza fasciata guttata. RUSTY SONG SPARROW. — Resident. Very common everywhere on the harbor, and along its tributary streams, and on the few natural prairies. Fairly common on the Quiniault. Heard two singing sweetly at Aberdeen in February in cold wintry weather. The finest songster in this region.

Chelidon erythrogaster. BARN SWALLOW. — Summer resident. Common on the harbor, especially at Hoquiam. A few seen on Stevens Prairie.

Tachycineta bicolor. TREE SWALLOW. — Summer resident. A pair seen May 10 perched on a snag on a sand bar of the lower Humptulips. Another noted near the same place, July 4.

Tachycineta thalassina. VIOLET-GREEN SWALLOW. — Summer resident. Pretty common on the harbor, especially at Hoquiam. Have noted none at Stevens Prairie.

? **Clivicola riparia**. BANK SWALLOW.—Summer resident. Not common. First noted in 1891 on Stevens Prairie May 3. Seen also on the lower Humptulips July 4 and at other times. I have no specimen of this bird; it may be *S. serripennis*.

Lanius ludovicianus excubitorides. WHITE-RUMPED SHRIKE. — Resident? Rare. Three seen June 10, 1890, in a small clearing on the Humptulips. None seen since.

Vireo gilvus. WARBLING VIREO. — Summer resident. I secured specimens while at Quiniault Lake June 12 and 14. I have heard it often on the Humptulips before and since then.

Helminthophila celata lutescens. LUTESCENT WARBLER. — Summer resident, not very common. One shot on Stevens Prairie April 22; others shot June 15 and 23.

? **Dendroica æstiva**. YELLOW WARBLER. — Summer resident. A Warbler, taken to be this one, was seen June 12 perched in a small tree on the river-bottom of the Upper Quiniault.

Dendroica auduboni. AUDUBON'S WARBLER. — Summer resident. Not common. One shot April 22 on Stevens Prairie, the only one noted.

Dendroica nigrescens. BLACK-THROATED GRAY WARBLER. — Summer resident. A pair seen May 11 on the harbor near Hoquiam. No others noted.

? **Dendroica occidentalis**. HERMIT WARBLER. — Summer resident? At Hoquiam, July 10, I am very sure I saw a female of this species. It was but a few yards away, on and about a clump of bushes on the open marsh, and was very restless. A few days afterward I saw the same bird,—or another one like it.

Geothlypis macgillivrayi. MACGILLIVRAY'S WARBLER. — Summer resident. One shot on Stevens Prairie, June 23, was the only one noted.

Sylvania pusilla pileolata. PILEOLATED WARBLER. — Summer resident. Very common throughout this region. In 1891 first noted April 29 on the East Humptulips. The commonest Warbler here.

Anthus pensilvanicus. AMERICAN PIPIT. — Migrant. Uncommon. Two were shot on Stevens Prairie, April 22, out of a flock of seven or eight which were the only ones seen there.

Cinclus mexicanus. AMERICAN DIPPER. — Resident. Common on the upper part of the Humptulips, where the river is swift and its bed rocky. On April 12 I found these birds far down the Humptulips at the time of high water, but on July 4 there was no trace of them there. They

descend the Upper Quiniault in the winter to the Lake, I am told, and can then be found on its beach.

Salpinctes obsoletus. ROCK WREN. — Summer resident? A few observed on the Wishkah River and on the East Humptulips in June, 1890; no specimen shot. Not seen in 1891 on the East Humptulips. I have not been on the Wishkah since August, 1890.

Troglodytes hiemalis pacificus. WESTERN WINTER WREN. — Resident. Common everywhere in the thick undergrowth and 'trash' of the heavy timber. Sunshine and light this bird does not need to help it trill its cheery song.

Certhia familiaris occidentalis. CALIFORNIAN CREEPER. — Resident? Uncommon. I saw a few in January on the East Humptulips.

Parus gambeli. MOUNTAIN CHICKADEE. — Resident? One seen at Hoquiam, May 16, was the only one noted.

Parus rufescens. CHESTNUT-BACKED CHICKADEE. — Resident. Nearly as common in the timber and elsewhere as *Troglodytes h. pacificus*.

Regulus satrapa olivaceus. WESTERN GOLDEN-CROWNED KINGLET. — Resident. Not nearly as common as *P. rufuscens*. A small flock seen on the East Humptulips in January, and three birds near the West Humptulips May 29; the latter seemed to be breeding. Heard at times. Seen at Hoquiam in May.

Regulus calendula. RUBY-CROWNED KINGLET. — Resident? Rare. Shot two on Stevens Prairie April 22. One had not a vestige of the scarlet crown patch. No others noted.

Turdus ustulatus. RUSSET-BACKED THRUSH. — Summer resident. Very common throughout the river-bottoms, and common on the small prairies and in the timber. Musical and timid. It comes about the time the salmon-berry bushes blossom; and goes when its berries are gone.

Merula migratoria propinqua. WESTERN ROBIN. — Resident. Less common than *Turdus ustulatus*, but a common bird on the harbor, the Humptulips, and Stevens Prairie. I saw some on Axford Prairie in February in the midst of our wintriest weather.

Hesperocichla nævia. VARIED THRUSH. — Resident. Not quite as plentiful, I think, as *T. m. propinqua*. Most migrate, but a few stay through the winter on the East Humptulips. One seen there February 7 during cold weather.

Sialia mexicana. WESTERN BLUEBIRD. — Migrant? One seen May 15 at Hoquiam, perched on an electric-light wire. No others noted.

Sialia arctica. MOUNTAIN BLUEBIRD. — Migrant? Two were seen on Stevens Prairie April 22; one was secured. No others noted.

A LIST OF BIRDS TAKEN ON MARAGUANA, WATLING'S ISLAND, AND INAGUA, BAHAMAS, DURING JULY, AUGUST, SEPTEMBER, AND OCTOBER, 1891.

BY CHARLES B. CORY.

MARAGUANA (August 5 to September 14).

Larus atricilla *Linn.*
Gelochelidon nilotica (*Hasselq.*).
Ardea tricolor ruficollis *Gosse.*
Ardea virescens (*Linn.*).
Nycticorax violaceus (*Linn.*).
Himantopus mexicanus (*Müll.*).
Tringa maculata *Vieill.*
Tringa minutilla *Vieill.*
Totanus flavipes (*Gmel.*).
Symphemia semipalmata (*Gmel.*).
Bartramia longicauda (*Bechst.*).
Ægialitis vocifera (*Linn.*).
Ægialitis wilsonia (*Ord*).
Arenaria interpres (*Linn.*).
Hæmatopus palliatus *Temm.*
Columba leucocephala (*Linn.*).
Columbigallina passerina (*Linn.*).
Ceryle alcyon (*Linn.*).
Tyrannus dominicensis (*Gmel.*).
Loxigilla violacea (*Linn.*).
Spindalis zena (*Linn.*).
Euetheia bicolor (*Linn.*).
Chelidon erythrogaster (*Bodd.*).
Vireo crassirostris (*Bryant*).
Cœreba bahamensis (*Reich.*).
Dendroica petechia gundlachi *Baird.*
Dendroica dominica (*Linn.*).
Dendroica discolor (*Vieill.*).
Mimus polyglottus orpheus (*Linn.*).
Mimus gundlachi *Cabun.*
Polioptila cærulea (*Linn.*).
Margarops fuscatus (*Vieill.*).

WATLING'S ISLAND (September 28 to November 9).

Larus atricilla (*Linn.*).
Phalacrocorax dilophus floridanus (*Aud.*). — Eight specimens.
Ardea tricolor ruficollis (*Gosse*).
Ægialitis vocifera (*Linn.*).
Coccyzus minor maynardi *Ridgw.*
Coccyzus americanus (*Linn.*).
Tyrannus dominicensis (*Gmel.*).
Dolichonyx oryzivorus (*Linn.*). — Oct. 12, female.
Habia ludoviciana (*Linn.*). — Oct. 20, female.
Euetheia bicolor (*Linn.*).
Vireo olivaceus (*Linn.*). — Oct. 5, male.
Cœreba bahamensis (*Reich.*).
Mniotilta varia (*Linn.*).
Compsothlypis americana (*Linn.*). — Five specimens.

Dendroica tigrina (*Gmel.*). — Seven specimens.
Dendroica petechia gundlachi *Baird.* — Common, breeds.
Dendroica maculosa (*Gmel.*). — Six specimens, Oct. 6-21.
Dendroica striata (*Forst.*). — Thirty-six specimens.
Dendroica blackburniæ (*Gmel.*). — Two specimens, Oct. 12.
Dendroica dominica (*Linn.*). — Six specimens.
Dendroica virens (*Gmel.*). — Oct. 12, male.
Dendroica palmarum (*Gmel.*). — Oct. 20, female.
Dendroica discolor (*Vieill.*). — Twenty-five specimens.
Seiurus aurocapillus (*Linn.*). — Thirteen specimens.
Mimus gundlachi *Caban.*
Margarops fuscatus (*Vieill.*).

INAGUA.

Gallinula galeata (*Licht.*). — July 17.
Tringa minutilla *Vieill.* — July 28.
Totanus flavipes (*Gmel.*). — July 28.
Myiarchus sagræ *Gundl.*
Loxigilla violacea (*Linn.*).
Vireo olivaceus (*Linn.*). — Sept. 17, female.
Vireo crassirostris (*Bryant*).
Cœreba bahamensis (*Reich.*).
Helmitherus vermivorus (*Gmel.*). — Sept. 22, female.
Dendroica petechia gundlachi *Baird.*
Mimus gundlachi *Caban.*

NOTES ON THE RANGE AND HABITS OF THE CAROLINA PARRAKEET.

BY AMOS W. BUTLER.

THE CAROLINA PARRAKEET (*Conurus carolinensis*), whose range is now confined to quite restricted areas in some of our southern States, was formerly known as a characteristic bird of Indiana. At the time of its greatest range in that State, within historic times, it was known from New York, Pennsylvania and Maryland to Kansas, Nebraska, and possibly Colorado. It is my desire to present some evidence tending to show its distribution in Indiana and neighboring States together with some notes upon its habits.

In 1831 Audubon notes them from the vicinity of Cincinnati, and states: "Our Parrakeets are very rapidly diminishing in number, and in some districts, where twenty-five years ago they were plentiful, scarcely any are now to be seen. At that period [1806] they could be procured as far up the tributary waters of the Ohio as the Great Kanawha, the Scioto, the heads of the Miami, the mouth of the Manimee (Maumee) at its junction with Lake Erie, on the Illinois River and sometimes as far northeast as Lake Ontario. At the present day very few are to be found higher than Cincinnati, and it is not until you reach the mouth of the Ohio that Parrakeets are met with in considerable numbers." Wilson after mentioning their occurrence near Lake Michigan, in latitude 42°, and also twenty-five miles northwest of Albany, N. Y., speaking of his trip down the Ohio, says of this bird: "In descending the Ohio, by myself, in the month of February, I met with the first flock of Parroquets at the mouth of the Little Scioto. I had been informed by an old and respectable inhabitant of Marietta, that they were sometimes, though rarely, seen there. I observed flocks of them afterwards at the mouth of the Great and Little Miami [the former near Lawrenceburg, Ind.], and in the neighborhood of the numerous creeks that discharge themselves into the Ohio." He also reported them in great numbers at Big Bone Lick in Kentucky.

Dr. Kirtland in 1838 says: "The Parrakeets do not usually extend their visits north of the Scioto, though I am informed, perhaps on doubtful authority, that thirty years since [1808] flocks of them were seen on the Ohio at the mouth of Big Beaver, thirty miles below Pittsburg." Atwater notes them as far north as Columbus, Ohio, and Mr. M. C. Read at Talmadge, Summit Co., Ohio. Dr. F. W. Langdon reports them from Madisonville, near Cincinnati, during the summers of 1837, 1838, and 1839. Few were seen in 1840, and none after that year. Nelson in his 'Birds of Northeastern Illinois' says: "Formerly occurred. Specimens were taken in this vicinity by R. Kennicott many years ago, and Dr. H. M. Bannister informs me he has seen it in this vicinity." Mr. Robert Ridgway in his 'Ornithology of Illinois', 1889, says: "Fifty years ago [1839] it was more or less common throughout the State. The National Museum possesses a fine adult example from Illinois, ... another from Michigan."

The earliest published notice I find of its occurrence in Indiana is in Dr. Haymond's account of the 'Birds of Southeastern Indiana' in 1856 in the Proceedings of the Philadelphia Academy. He says: "This bird was formerly very numerous along the White Water River. Several years have elapsed since any of them have been seen." The same author in his report on the Birds of Franklin County, Indiana, 1869, also alludes to their former abundance.

Some little investigation has brought to my attention a number of interesting facts. Dr. George Berry of Brookville informs me they were last seen by him in that vicinity in 1835. Mr. Peter Pelsor of Metamora formerly lived at North's Landing, Switzerland County, where in the winter of 1838-39, Parakeets were common. Prof. John Collett has informed me of its occurrence along the Wabash River as far up as Fort Wayne. He further notes that as a boy, from 1834 to 1844, he was accustomed to seeing flocks of from thirty to fifty on his father's farm in Vermilion County. Judge A. L. Roache, of Indianapolis, informs me that his father's family moved to Monroe County in 1828 when Parrakeets were common there. The family came from western Tennessee where the bird was well known and abundant. He says they were to be found in Monroe County also in 1836, and the same year, and perhaps the year after, he noted them near Rockville, Parke County. Prof. B. W. Evermann has also learned from the late Louis Bollman of the occurrence of the species in Monroe County in 1831. My father informs me that the last Parrakeets he saw in Indiana were at Merom, on the Wabash River in 1834. At that time he saw a small flock of about a dozen. He also told me of seeing a small number—perhaps six individuals—along Pogue's Run near Indianapolis. He thinks the last-mentioned observation was made in 1832. When he was a boy (1806-8) they were common about Brookville, but at that time they were noticeably less in numbers than a few years before. Prof. E. T. Cox informs me they were as numerous as Blackbirds (*Quiscalus quiscula æneus*) when he went to New Harmony in 1826.

Mr. Fielding Beeler of Indianapolis says he was born in 1823 and grew to manhood within seven miles of the city in which he now lives, and has a very distinct recollection of the Parrakeets. They were rather rare, and he thinks they disappeared from that

vicinity about 1835. Near the site of the present village of Centerton, Morgan County, Mr. Beeler says they were more numerous. There they frequented the bottoms of White River. They were last seen in that vicinity about 1838-40.

Professor John Collett thinks the Parrakeet left Indiana in 1844. This is evidently not the case. Hon. John W. Ray informs me they were observed by him in Clark County up to about 1844, and in Greene County in 1849. Mr. W. B. Seward of Bloomington informs me that these birds were well known to him from 1840 to 1850, and in many places were plentiful. The late Dr. Richard Owen a short time before his death very kindly furnished me with quite a number of valuable notes on the occurrence of this species near New Harmony, based upon observations of his own, of Mr. Sampson, and of several of the older residents of that place. Mr. Sampson remembers them as common when he went there in 1827. Further evidence is presented of their known occurrence in that vicinity in 1840, 1842, 1850, 1857, and last in 1858.

From the evidence here presented it seems that they had disappeared almost wholly from Ohio and from Indiana, save the southwestern portion, by some time between 1835 and 1840, and that they left Indiana about 1858. So far as I know, there is but one record of the recurrence of the species in the region thus vacated. The late Dr. J. M. Wheaton gives, upon what he considers good authority, an account of a flock of twenty-five or thirty individuals at Columbus, Ohio, in July, 1862. Within about thirty years from the time first referred to by Audubon the species had entirely disappeared from the territory south of a line drawn, from Chicago, Ill., to Albany, N. Y., to, approximately, a line drawn from some point in Virginia, or perhaps North Carolina, to the lower Wabash Valley. In the next forty-five years they disappeared from southwestern Indiana, Illinois, Iowa, Nebraska, Kansas, Colorado, Kentucky, most of Missouri, and from the immediate vicinity of the Mississippi River, also from the States of the Atlantic coast as far south as Florida. The steady contraction of occupied area still continues. They are now perhaps found in but a few restricted localities. In the southern part of Florida they are still to be found in some numbers. Perhaps a small area in the interior of some of the Gulf States may still be occupied by them. Besides there is an area,

whose limits are undefined, in Indian Territory, extending probably into Texas and possibly into Arkansas and Missouri, where Parrakeets are said to be found still. It is but natural to think that the extinction of these birds is but a question of a few years.

Not a great deal is known of the habits of these birds throughout their earlier range, but some characteristic facts are remembered, and for such as I have I am indebted to the gentlemen whose names I have mentioned. The species seems to have been present throughout the year over most, if not all, of its range, and consequently must have bred. They were currently reported to hibernate, but sometimes appear to have been active during winter. Concerning the habit of hibernation I am furnished the following note by Prof. Collett: "In 1842 Return Richmond of Lodi, Indiana, cut down, in the cold weather of winter, a sycamore tree some four feet in diameter. In its hollow trunk he found hundreds of Parrakeets in a quiescent or semi-torpid condition. The weather was too cold for the birds to fly or even to make any exertion to escape. Mr. Richmond cut off with his saw a section of the hollow trunk some five feet long, cut out a doorway one foot by two in size, nailed over it a wire screen of his fanning mill, rolled this cumbersome cage into the house, and placed in it a dozen of the birds. They soon began to enjoy the feed of fruit, huckleberries and nuts he gave them, and he had the pleasure of settling absolutely the disputed question as to how they slept. At night they never rested on a perch, but suspended themselves by their beaks and with their feet on the side of the cage. This was repeated night after night during their captivity."

To Mr. W. B. Seward I am indebted for the following notes: "My first intimate acquaintance with the Parrakeet was about the year 1845 when I secured a nest of young ones on the border of White River, in Owen County. The nest was in a decayed tree that had been blown down by the wind. The young birds had been secured by a farmer boy of whom I bought them soon after they had been captured. I think there were five of them. My impression now is that the nest was inside of the tree, but of this I am not now positive owing to the lapse of time and the fact that I was more interested in the pets I had secured than in the exact situation of the nest where they were hatched. But I remember that it was a much decayed tree with but few limbs, so it was hardly possible that there was a place on the outside of the tree

where a nest could have been secured. I think it may be set down as a fact that Parrakeets make their nests inside of hollow trees, always selecting a tree with a side opening into the hollow near the top. I had often, before and since I secured these birds, passed through the region where they were captured, and seldom if ever passed without seeing Parrakeets. It was near White River, where the road was for many miles almost always in sight of the river, with cornfields on the bottom lands and here and there a dead tree in the fields and on the river bank. Parrakeets, more or less in numbers (never in flocks), could be seen flying from tree to tree. My admiration for these beautiful birds was unbounded, and I often wished I could capture one, but they were so wild that I had no hope of ever accomplishing it. The young birds I secured all lived to maturity and were kept by me for several years in a large cage made for the purpose. The special food of the Parrakeet was the 'cuckle burr.' It was my custom to gather large quantities of these burrs in the fall to last until they ripened again. In eating, the bird picked up a burr with its beak, this was then delivered to one foot raised to receive it. Then one end of the burr was cut off with the sharp-ended under beak, the burr being held with the foot and the under side of the upper beak while two small kernels were extracted with the assistance of the tongue and the husk was thrown away. Parrakeets will leave any other kind of food for cuckle-burrs, but will eat all kinds of nuts, if broken, and various kinds of seeds. I never knew them to eat meat of any kind. They invariably roost on the side of the cage with their beak hooked over one of the wires. It has been claimed that they roost hanging by their beak but this is a mistake. I did everything I could to induce them to breed, by providing them with nests, materials for shells, etc., but without success. I do not think they will breed in confinement. Most of the time I kept their wings cropped so that they could not fly, and allowed them much freedom in this way. They would climb into trees in the yard, but return to the cage to feed and to roost. They knew me and were pleased to have me visit them and allow them to climb on me, but would bite me the same as any one else if I put my hands on them. They were extremely fond of one another and exhibited great distress if one was absent for any length of time. I often took one or two of them away on my shoulder and was absent an hour or two, and

at such times a noisy racket was kept up till my return." Another authority speaking of these same birds says: "If at any time an accident happened to one of them, or one escaped from confinement, the household, and neighborhood as well, was aroused by their outcries. They would not be satisfied until the escaped bird was found and returned, when quiet was restored."

The Parrakeets are said by Prof. Collett to be very affectionate in their wild state. It is said that when one of a flock was wounded, the others gathered about, regardless of danger, and made every effort to render assistance to their unfortunate comrade. They were very easily tamed. A crippled bird seemed at once to be contented with the cabin to which it was taken, and in a day's time would clamber over the clothing of its captor and take food from his hand.

As has been mentioned, the principal food of the Parrakeet was 'cuckle-burrs' or 'cockle-burrs' (*Xanthium canadense* Mill.) which grew abundantly on the river bottoms. So great was their fondness for these burrs that everyone noticed it, and for this destruction of weed seeds they were held in high regard by farmers. They also ate pecans, acorns, beechnuts, haws, berries of the black gum, persimmons, and hackberries. Next to cuckle-burrs they preferred the last-mentioned food. In spring they were very destructive in orchards, biting out the tender shoots and eating the blossoms and young fruit. In summer and autumn they lived largely on fruit and grain. Apples, grapes, and cherries are especially mentioned. They were gregarious, moving in flocks of from six to one hundred, and are said to have been as common, in some localities, as Blackbirds (Bronzed Grackles). They are said by one authority to have alighted on an apple tree in such numbers as almost to cover it over. When the fruit was ripe, sometimes the entire crop would be destroyed. Often they seemed to destroy in a spirit of mischief. They would tear off apples and other fruits, and after taking a bite throw them to the ground, and so continue. They tore off the heads from wheat stalks, and seemed to delight in throwing them away.

The favorite haunts of these birds were along water courses and about lakes and sloughs. Especially were they abundant in the extensive bottom lands along the rivers. There it was that cuckle-burrs grew most abundantly and there were always many hollow trees suitable for their habitations. Seldom were they found away from such surroundings.

They were quite expert acrobats, and became proficient in many ways. They seemed to delight in exhibiting their ability and practical jokes to an audience whether of birds or human beings. One thing in which they were said to have delighted, in captivity, was climbing a suspended string. They were very cleanly in their habits, and are said to have bathed regularly every day at a particular spot.

All facts concerning their former distribution and their habits as noted when they ranged north of the Ohio River, are very much desired.

NINTH CONGRESS OF THE AMERICAN ORNITHOLOGISTS' UNION.

THE NINTH CONGRESS of the American Ornithologists' Union was held in the Library of the American Museum of Natural History, New York, Nov. 17–19, 1891, the President, Mr. D. G. Elliot, in the chair. In the absence of the Secretary, Mr. Sage, on account of illness, Mr. C. F. Batchelder was appointed Secretary *pro tem.* There were present during the session fourteen Active Members, and thirty-two Associate Members. The present membership of the Union, as given in the report of the Secretary, is as follows: Active Members, 47; Honorary Members, 22; Corresponding Members, 72; Associate Members, 352;— Total, 493, showing an increase of 28 for the year. During the year the Union has lost by death, one Honorary Member, Dr. August von Pelzeln of Vienna, Austria; one Active Member, Col. N. S. Goss, a member of the Council, of Topeka, Kansas; and one Associate Member, Dr. J. I. Northrop of New York City. The Treasurer's report exhibited the finances of the Union in good condition, there being no liabilities, and a balance in the Treasury.

Dr. Anton Reichenow, of Berlin, Germany, was elected an Honorary Member; Dr. Max Fürbringer of Amsterdam, Holland, Ernst Hartert of London, England, and Wm. V. Legge of Hobart Town, Tasmania, were elected Corresponding Members,

and ninety-six new members were added to the list of Associates. After considerable discussion it was voted not to elect any Active Members this year. On the motion for the election of officers a letter was read from Mr. Robert Ridgway, in which he declined to be a candidate for Vice-president. The officers elected were D. G. Elliot, President; Wm. Brewster and H. W. Henshaw, Vice-presidents; John H. Sage, Secretary; Wm. Dutcher, Treasurer. The vacancies in the Council, occasioned by the above election and the death of Col. Goss, were filled by the selection of R. Ridgway and C. F. Batchelder.

On call for reports of Standing Committees, Dr. Merriam on behalf of the Committee on Bird Measurements reported progress and asked for the continuance of the Committee, which was granted. Mr. G. B. Sennett, chairman of the Committee on Bird Protection, reported progress, and Mr. Brewster stated what had been done to protect the Terns on Muskeget Island during the past four years. Mr. Dutcher on behalf of the Committee for the Audubon Monument Fund, reported progress, and the committee was continued. No formal report was received from the Committee on Avian Anatomy and the Committee was continued.

The Amendments to the By-laws proposed at the Eighth Congress were then all adopted, and new amendments were referred to the next Congress. The Council subsequently provided for the publication of a new edition of the By-Laws and Rules, as revised to date.

Rule X of the By-Laws and Rules, relating to the Committee on Publications, was amended so as to make this Committee consist of the President, Secretary, Treasurer, and the Editors of 'The Auk,' *ex officio*. By a subsequent vote of the Union this Committee was relieved of the duty, formerly assigned it, of also acting as a Committee on the Nomenclature and Classification of North American Birds, in reference to the annual supplements to the Check-List, and a new Committee for this especial purpose was appointed, consisting of the following nine persons: Messrs. Allen, Brewster, Chapman, Cory, Coues, Elliot, Henshaw, Merriam, and Ridgway.

The rest of the session was devoted to the reading of scientific papers, of which the following is a list.

1. The Inheritance of Acquired Characters. President's Address. D. G. Elliot.

*2. The American Scoter. Gurdon Trumbull.
3. The Migrations in Chester County, South Carolina. L. M. Loomis.
*4. Summer Birds of the Crest of the Pennsylvania Alleghanies. J. Dwight, Jr.
5. Birds Attracted by the Rays of Liberty's Torch. J. Dwight, Jr.
*6. The Genus *Peucæa* as represented in Cooke County, Texas. George H. Ragsdale.
7. A Preliminary Study of the Grackles of the Subgenus *Quiscalus*. Frank M. Chapman.
8. Geographical Variation in the North American Forms of the Genus *Colaptes*. J. A. Allen.
9. The Intergradation of *Colaptes auratus* with *C. cafer*. J. A. Allen.
10. Suggestions regarding the Genesis of the North American Forms of *Colaptes*. J. A. Allen.
*11. List of Birds observed at Salamanca, Costa Rica, from March 15 to April 12, 1890. G. K. Cherrie,
12. Why the Mockingbird Left New Jersey.—A Geological Reason. Samuel Lockwood.
*13. Habits of the Black-bellied Plover in Massachusetts. George H. Mackay.
*14. Habits of the Eskimo Curlew in New England. George H. Mackay.
15. The Birds of the Pribylof Islands, Alaska. Illustrated by Lantern Slides. William Palmer.
16. Exhibition of Lantern slides representing Birds in Life. Contributed by Members.
*17. Cause of the Late Breeding of the American Goldfinch. Henry Hales.
*18. Notes on the Range and Habits of the Carolina Parrakeet. Amos W. Butler.
*19. A List of Warblers found at Raleigh, North Carolina. C. S. Brimley.
20. A Probable Occurrence of the European Curlew (*Numenius arquatus*) on Long Island, N. Y. William Dutcher.
21. Some of the Results of the Death Valley Expedition. Dr. C. Hart Merriam.
22. On Protection of Birds. T. A. Schurr.
*23. Some Birds recently Added to the Collection of the New York State Museum. Wm. B. Marshall.

The exhibition of photographs of living birds, and nests *in situ* thrown on screens, was given in the lecture hall of the Museum. About eighty were shown, a marked advance from last year.

*Owing to lack of time, read by title only.

They proved of great interest, and it is hoped that such exhibitions will become a permanent feature of the annual meetings.

Resolutions were adopted tendering the thanks of the Union to the President and Trustees of the American Museum of Natural History for the courtesies extended to the Union; and to the Linnæan Society of New York for their hospitality shown to the Members during the Ninth Congress.

Through the kindness of Mr. D. G. Elliot, a selected series of drawings, by Wolf of London, were exhibited in the Library of the Museum during the session, these drawings being the originals of Mr. Elliot's 'Birds of North America,' and of his Monographs of the Grouse, Pheasants, etc.

It was voted that the Tenth Congress of the Union should be held in Washington, D. C., Nov. 15, 1892.

RECENT LITERATURE.

The New Nuttall.* Thomas Nuttall's 'Manual of the Ornithology of the United States and Canada,' originally published in two volumes in 1832 and 1834, with a second edition of the first volume (Land Birds) in 1840, was a work so charmingly written and so true to nature that it has never ceased to win admiration and serve as an inspiration to bird lovers. While Nuttall was not deeply versed in the technicalities of ornithology, his bird biographies display a profound sympathy with his subject, and an intimate acquaintance with the ways of his beloved feathered associates of field and wood, acquired through a long period of varied and widely extended field experience, during his expeditions as a botanist and explorer to distant and then little known parts of the United States. In addition to his love of bird life and his keen powers of observation, he had the literary gift to portray in a simple yet fascinating way what he saw and heard, without being unduly sentimental or lapsing into exaggeration. In this rests the charm of Nuttall's 'Manual,' the republication of which has been till now delayed, though often seriously contemplated during the many years since it has practically been out of

* A | Popular Handbook | of the | Ornithology | of the United States and Canada, | Based on Nuttall's Manual. | By Montague Chamberlain. | [Vignette] Vol. I | The Land Birds. | [Vol. II. Game and Water Birds.] Boston: | Little, Brown and Company. | 1891. 2 vols. 8vo. pp. i-xlviii, 1-473; i-viii, 1-431, with 2 colored plates and numerous illustrations in the text.

print. During the fifty years which have elapsed since the original publication of the 'Manual' our knowledge of the subject has greatly advanced, and much that Nuttall wrote, including especially his classification and the more technical parts of his work, have become obsolete, while his statements respecting the distribution of some of the species require revision. But his biographies have for the most part lost none of their truthfulness and charm. It is, therefore, a subject of congratulation that the successors of the original publishers of the 'Manual' have decided to reissue the work in a modernized form, eliminating from it the obsolete and erroneous parts and supplementing it by a brief résumé of the advances made since Nuttall's time.

Mr. Chamberlain, to whom was intrusted the preparation of the new edition, has done his work fairly well, considering the limitations by which he was doubtless necessarily restricted by his publishers, the new edition, while more generously illustrated than the original work, containing much less matter. The many pages devoted by Nuttall to general remarks on the higher groups, as orders and families, are wholly discarded, as are his rather elaborate descriptions of the genera and species. Also a number of his species are omitted, for reasons to be given later. Although Nuttall's classification and nomenclature are both very properly eliminated, his arrangement of the species is, with slight exceptions, retained, thus preserving to a great degree the original character and appearance of the 'Manual.'

Of Nuttall we thus have his charming 'Introduction' reproduced nearly in full, and the principal part of his biographies. The new matter consists of new vernacular and technical names, a short diagnosis of generally about three to five lines in small type,—often too brief to be of much importance beyond giving a general idea of the appearance of the bird,—while about five lines more of similar type tell the story of the nest and eggs, aside from the information Nuttall's biographies may chance to give. Nuttall's biographical matter follows next, with at the end, as occasion may require, a few lines, again in smaller type, by Mr. Chamberlain, qualifying or supplementing Nuttall's account, generally relating to the geographical range of the species, as now known.

In general style the new edition, in typographic arrangement, recalls the old, though the size of the paper is larger and the general effect more modern; the illustrations are more numerous and better, some of those made expressly for the work being excellent; others, however, are far from satisfactory. In two instances figures of European species are given in place of figures of the birds they purport to represent (see Vol. II, pp. 86 and 340), and the figure of Wilson's Warbler (Vol. I, p. 167) is misplaced.

Nuttall's 'Manual of the Ornithology of the United States and Canada' was a handbook of the subject as then known. It is hence natural to expect that a 'Popular Handbook of the Ornithology of the United States and Canada, based on Nuttall's Manual,' would be for the present day what Nuttall's 'Manual' was in its day. But alas, while the title-page

implies this, we have a work of far more limited scope, the proper title of which would be a 'Popular Handbook of the Ornithology of Eastern North America, based on Nuttall's Manual.' For, after reading through three and a half pages of the four and a half pages of 'Preface,' devoted chiefly to an eulogium on Nuttall's original work, we meet the statement that the limits of a handbook compel the omission of "those species which occur only to the westward of the Mississippi valley, though I have endeavored to make mention of every bird that has occurred within this Eastern Faunal Province, from the Gulf of Mexico to the Arctic Ocean, and to give their distribution and breeding area so far as these are known." This, then, is the real scope of the work and a correct statement of the nature and extent of the supplementary matter; it also accounts for the small size of the revised Nuttall. It is quite true that "only a few short chapters" of Nuttall "have been lost through restricting the scope of the present work to Eastern forms," but it would seem a little more in the line of strict commercial and scientific integrity to indicate the fact at some point earlier than in the last third of the preface. Indeed, the prospectus issued by the publishers goes so far as to promise "to give the reader the latest acquired facts regarding the species mentioned in the original work, also an account of the species and subspecies that have been discovered since Nuttall wrote," etc., with no intimation anywhere that the work is not a handbook of North American ornithology as implied in the title. The prospectus further implies the presence of many excellent features, "so far elaborated as the limits of a 'hand-book' will permit"—this saving clause covering apparently a large mental reservation.

The book, so far as it goes, is excellent, though not above criticism at many points, not a few of the annotations having an apparently perfunctory character, and being occasionally defective in point of accuracy and completeness, in respect to the ground they purport to cover. Occasionally the spirit of some of the comments is not eminently creditable from the pen of an intelligent ornithologist. The following from the 'Preface' is a case in point where, in contrasting Nuttall's work with that of later workers, we read: "For if a great advance has been made in the study of scientific ornithology,—which term represents only the science of bird-skins, the names by which they are labelled, and the sequence of these names, in other words, the classification of birds,—if this science has advanced far beyond Nuttall's work, the study of bird-life, the real history of our birds, remains just about where Nuttall and his contemporaries left it. The present generation of working ornithologists have been too busy in hunting up new species and in variety-making to study the habits of birds with equal care and diligence, and it is to Wilson and Audubon and Nuttall that we are chiefly indebted even at this day for what we know of bird-life"! Is this, then, the estimate Mr. Chamberlain places on the thousands of pages of field notes published during the last fifteen years by his confrères of the Nuttall Club and the A. O. U.—in the 'Nuttall Bulletin,' 'The Auk,' and the 'O. & O.,' to say nothing of other channels of publication!—J. A. A.

Shufeldt's 'Myology of the Raven.'*—This work, as stated in the title, is intended as 'A Guide to the Study of the Muscular System in Birds, and as such should be a welcome addition to the literature of avian anatomy. The Raven is chosen as the basis of the work on account of its being "a large representative of a very numerous and cosmopolitan family of birds, the Corvidæ," some near ally of which hence becomes readily accessible to students everywhere. It forms also a monograph of the muscular system of one of the leading Oscinine types, copiously illustrated by original drawings by the author from actual dissections. Much of the work appears to have been done under the unfavorable circumstances attendant upon isolation from libraries and museums. Since the work appeared, rather more than a year since, it has been extensively reviewed, by both favorable and unfavorable critics. While not an ideal production, its utility for the purpose for which it was written is beyond question, as it subserves a purpose no other work in English so well meets. The muscular system being to some extent variable in different types of birds, the more prominent departures from the structures met with in the Raven are generally more or less fully noted. The author acknowledges his indebtedness to many of the leading writers on the subject, and closes his volume with a bibliography of "important works and papers treating of the muscles of birds, compiled, abridged, and rearranged from the bibliographical lists of Hans Gadow" and other sources. He gives also in copious footnotes the synonymy of the principal muscles, as given by Gadow in his work on the muscles of birds in Bronn's 'Klassen des Thier-Reichs,' as well as much descriptive matter from the same source, transcribed from the original German without translation, also numerous extracts from the writings of Garrod and Forbes.—J. A. A.

Bolles's 'Land of the Lingering Snow.'†—This little book is a series of delightful sketches of rambles in the vicinity of Cambridge, with excursions to Cape Cod, Wachusett and Chocorua, at various dates from January to June. Several of the essays are distinctively ornithological, as 'The Bittern's Love Song,' 'The Vesper Song of the Woodcock,' 'The Coming of the Birds,' 'A Forest Anthem,' etc., while all have a distinctly ornithological flavor, and record many observations of special interest, woven in with charming allusions to the ever changing face of nature under the varying aspects of winter, spring, and early summer. Everywhere the author gives evidence of the poetic sense, keen sympathy with nature, acute powers of observation, and an ability to portray with unusual skill and realistic effect the scenes noted amid storm and sunshine as winter passed on through spring into summer.—J. A. A.

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* The | Myology of the Raven | (*Corvus corax sinuatus*). | A Guide to the Study of the Muscular System | in Birds. | By | R. W. Shufeldt. | London: | Macmillan and Co. | and New York | 1890. 8vo., pp. xix+ 343, with about 90 figures in the text.

†Land of the Lingering | Snow | Chronicles of a Stroller in | New England | from January to June | By | Frank Bolles. | [Vignette] Boston and New York | Houghton, Mifflin and Company | The Riverside Press, Cambridge | 1891. 12mo., pp. 234.

Keyser's 'Bird-dom.'*—Despite its rather unprepossessing title, 'Bird-dom' proves to be a collection of twenty-six ornithological essays possessing much attractiveness as a series of popular sketches of bird life, most of which have previously appeared in various magazines. The writer gives his experiences in the field, in the hope of awakening in others an appreciation of nature. "If the hearts of the young," says our author, "could be stirred to a love of nature, and their minds aroused to study her, much would be done toward solving some of the perplexing social problems of the day." The titles of the essays, as 'The Alert Eye,' 'A Lesson in Bird Study,' 'Difficulties of Bird Study,' 'First Meetings,' 'Birds on the Wing,' 'My Woodland,' 'Lyrists of a Suburb,' etc., suggest to some degree the character of the book, in which the writer tells how he learned to recognize birds, relating his methods, his successes and his failures, and their causes. A healthful spirit, unlimited enthusiasm, and an intense love of birds pervades Mr. Keyser's little book, which is interspersed with many useful hints to those who would have a 'speaking acquaintance' with the feathered tenants of field and wood. While appreciating the need of specimens on the part of specialists, he disapproves of the killing of birds by amateurs, and offers this good advice: "So I advise that the money spent for guns and cartridges be spent in visiting some good college, or a large city, where an extensive collection of mounted birds may be studied at leisure. In that way you will be able to clear up ornithological points without resort to bloodshed." He has evidently become a proficient field ornithologist without destroying many birds, and writes delightfully and in an original vein of many of his favorite bird friends. The book is based apparently on observations made mainly in northeastern Ohio, and a Kirtland's Warbler is one of the author's much prized discoveries.—J. A. A.

Scott B. Wilson's Aves Hawaiienses.† — The progress of ornithology of late years is well exemplified by the work before us. Twenty years ago a small octavo pamphlet held all we knew about the birds of one of the most interesting and peculiar zoögeographical provinces; while today it requires a handsome quarto volume with numerous colored plates to fully represent our knowledge of the subject. Twenty years ago the number of species known to inhabit the Hawaiian Islands was considered to be about forty by the best authority (Sclater, Ibis, 1871, p. 361); today the number is scarcely less than seventy; and the most astonishing fact is that this increase of our knowledge of one of the most accessible and most civilized archipelagoes in the Pacific Ocean has taken place during

* Bird-dom | By | Leander Keyser | [Motto=6 lines, from Lowell] Boston | D. Lothrop Company | Washington Street opposite Bromfield. No date. 1891, 12mo, pp. 226.

†Aves Hawaiienses.—The Birds of the Sandwich Islands. By Scott B. Wilson, F.Z.S. Assisted by A. H. Evans, M.A., F.Z.S. London, R. H. Porter. Part i. Dec. 1890; part ii, Sept. 1891.

the last five years. To Mr. Scott B. Wilson, who spent eighteen months on the islands in order to study their ornithology, much credit is due for this increase, and it is with great pleasure that we extend our welcome to the work which he is now publishing, and we wish specially to call the attention of our American ornithologists to it, as from the situation of the Hawaiian Archipelago in relation to our own continent we ought to take more interest in its avifauna than has been done hitherto.

The work is uniform in appearance with most of the more ambitious ornithological monographs which have been published in England of late years, and is issued in five parts, two of which have already been published. These two parts treat of 18 species, and are accompanied by 20 plates, some of them representing species now extinct or nearly so. The second part contains a very valuable and interesting treatise by Dr. Hans Gadow 'On the Structure of Certain Hawaiian Birds with Reference to their Systematic Position,' to the illustration of which three of the plates are devoted. Many unexpected conclusions are the result of his investigation, and the ornithological public is under great obligations to Mr. Scott Wilson for not having spared any expense in order to have this side of the ornithology of the group as well taken care of as that devoted to the outside of the birds alone. For details and information we refer the reader to the book itself, and we advise all who can afford it to subscribe for it. The author has had heavy expenses in order to bring it out, and the work is well worth encouragement.

For the present we abstain from any remarks about various points on which we might disagree with the author. We prefer to wait until the work is finished, and then shall be glad to offer such remarks as might have a bearing on any special point. — L. S.

MacFarlane's Notes on Arctic Birds.*—From 1861 to 1866 Mr. MacFarlane had exceptional opportunities to study the birds breeding in the region lying between the lower Mackenzie River and Franklin Bay and southward to the sixty-seventh parallel, and especially in the neighborhood of Fort Anderson (lat. 68° 30′, long. 128°). The good use he made of his time has been long attested by the generous collections he sent to the Smithsonian Institution.

In the present paper,—a revised edition of one published two years ago in the Transactions of the Historical and Scientific Society of Manitoba, based on the author's memoranda made during these years,—he gives the results of his experience of the breeding habits of about a hundred and thirty species, especially of their nests and eggs. It would be difficult to overestimate the interest and importance of these notes, relating, as they do, to a region so remote and so little known. The only regret they inspire is that matter of such value was not given to the public many years ago.—C. F. B.

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* Notes on and List of Birds and Eggs collected in Arctic America, 1861-1866. By R. MacFarlane, [etc.]. Proc. U. S. Nat. Mus., Vol. XIV, 1891, pp. 413-446.

Fannin's 'Check List of British Columbia Birds.'* — In this list 308 species and subspecies are enumerated as occurring in British Columbia. Most of the records are based on the author's own observations, although some are entered upon the authority of several of his friends, and others are taken from Chapman's report on the Streator Collection, from Ridgway's Manual, and from other published sources. Under each species brief notes are given upon its abundance, seasons of occurrence, and distribution in the Province, with occasionally some remark upon its habits. The List closes with a short appendix describing the character of the country in different parts of the Province, and giving some valuable tables of rain and snow fall. The work is illustrated with an uncolored lithograph of *Falco columbarius suckleyi*.

Mr. Fannin's records enable him to extend the range of a number of species, especially among the water birds, considerably beyond what has been generally supposed to be their limits. On the other hand we note that he occasionally admits to the List some name that does not at present meet with general acceptance,— *Dendroica æstiva morcomi* and *Æchmophorus clarkii* are examples,— and it seems not unlikely that his further researches may lead him to change his views as to the identity of one or two of the subspecies he has recorded. He regrets that as yet a list of the birds of British Columbia must necessarily be incomplete, and he expresses the hope that the present List may "stimulate further and more careful research." In spite of the large amount of information he has now given us, there is, of course, a great deal yet to be learned, and the Province offers attractive fields which are still virgin soil to the ornithologist.— C. F. B.

Chapman on the Birds of Corpus Christi.† — In five or six weeks of March and April spent in a field where others had been before him Mr. Chapman succeeded in finding much that was new and interesting to repay his efforts.

After a brief sketch of the character of the vegetation and of the birds frequenting the different growths, followed by some observations on the spring migration and the faunal position of "southwestern" Texas, comes the main portion of the paper, 'Remarks on certain species observed.' Under this head are given various interesting notes upon thirty-four species. These relate in great part to the habits of the birds. One new subspecies is described, *Cardinalis cardinalis canicaudus*, its habitat being stated as "southwestern Texas, south into northeastern

*Check List | of | British Columbia Birds | by | John Fannin, Curator Provincial Museum, Victoria, B.C. | Associate Member American Ornithologists' Union. | September, 1891. | [Seal] | Victoria, B.C.: | Printed by Richard Wolfenden, Printer to the Queen's | Most Excellent Majesty. Pp. xiv, 49. Pl.

†On the Birds observed near Corpus Christi, Texas, during parts of March and April, 1891. By Frank M. Chapman. Bulletin American Museum of Natural History, Vol. III, No. 2, Art. XXII, pp. 315-328.

Mexico." Its most striking character is the coloration of the tail in the female, the rectrices being "broadly margined with gray, instead of .... narrowly edged with olivaceous brown" as in *C. cardinalis.*

The paper closes with a list of the birds observed which were not recorded* from Corpus Christi by Mr. Beckham, and another of those recorded by Mr. Beckham but which Mr. Chapman did not find.—C. F. B.

Chapman 'On the Color Pattern of the Upper Tail-coverts in Colaptes auratus.'† —Mr Chapman has availed himself of a large series of skins of *Colaptes* to study the differences in color pattern of the upper tail-coverts. He finds two distinct styles of marking with many variations and intermediate forms; one of these consists of transverse barring; the other shows longitudinal or concentric markings parallel to the border of the feather. Mr. Chapman's material leads him to conclude that the former pattern prevails among young birds and that a change to the other style is accomplished through successive moults.

He further believes that sufficient material—as yet lacking—of the more southern species of the genus will show them to possess the transversely barred pattern, which, if it should prove the case, might indicate that *C. auratus* is a more recent and extreme offshoot from the main *Colaptes* stock. Sex and locality seem to have nothing to do with these differences, but apparently there is enough individual variation in the markings to make satisfactorily definite conclusions difficult.—C. F. B.

Minor Ornithological Publications.—Forest and Stream.

This journal was last noticed in these pages in Vol. VII, pp. 388-398 (October, 1890). In Vols. XXXV and XXXVI we note the following (Nos. 2113-2203).

2113. *Hermit Thrush (T. pallasii) in Maryland in Summer.* By Arthur Resler. '*Forest and Stream*,' **Vol. XXXV**, No. 1, July 24, 1890, p. 11.

2114. *Chinese Pheasants in America.* Editorial, *Ibid.*, July 31, p. 28.

2115. *Pointer Dog and Mother Duck.* By A. B. H. *Ibid.*, Aug. 7, p. 48. — *Aix sponsa.*

2116. *Woodcock in Town.* By Hy. J. Growtage. *Ibid.*

2117. *Migration of Prairie Chickens.* By Levi S. Kegale. *Ibid.*, Aug. 21, p. 88.

2118. *Six Weeks with a Sparrow Family.* By Julia M. Hooper. *Ibid.*, Sept. 11, pp. 146, 147.

2119. *California Quail.* By A. *Ibid.*, Sept. 25, p. 187.

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* Proc. U. S. Nat. Mus., X, 633-696.

† On the Color-Pattern of the Upper Tail-Coverts in Colaptes auratus. By Frank M. Chapman. Bulletin American Museum of Natural History, Vol. III, No. 2, Art. XXI, pp. 311-314.

[**Forest and Stream.**—Continued.]

2120. *The Heath Hen. Notes on the Heath Hen (Tympanuchus cupido) of Massachusetts.* By William Brewster. *Ibid.*, p. 188.

2121. *Wild Pigeons in Virginia.* By D. *Ibid.*, p. 190.

2122. *Heath Hen of Martha's Vineyard.* By J. E. Howland. *Ibid.*, Oct. 2, p. 207.

2123. *Nesting Birds and Scent.* By Hermit. *Ibid.*

2124. *Ways of the Ruffed Grouse.* By Dorp. *Ibid.*, p. 210; Oct. 16, p. 249.

2125. *Notes on the Woodcock.* By D. S. S. *Ibid.*, Oct. 23, p. 267.

2126. *A Grouse Combat.* By Dorp. *Ibid.*, Oct. 30, pp. 286, 287.

2127. *Quail Invade Washington.* By T. H. B. *Ibid.*, p. 289. — *Colinus virginianus* in the city.

2128. *Woodcock, Whistle and Worm.* By H. B. N. *Ibid.*, Nov. 6, p, 307.

2129. *Chinese Pheasants in Illinois.* By W. O. Blaisdell. *Ibid.*, p. 312.

2130. *In a Heap of Leaves.* By Dorp. *Ibid.*, Nov. 13, p. 331. — *Bonasa umbellus.*

2131. *The Yellow Rail in Michigan.* By Morris Gibbs. *Ibid.*, Nov. 20, p. 347.

2132. *Another Woodcock in Brooklyn.* By W. Arthur Hale. *Ibid.* p. 352.

2133. *The Ways of the Woodcock.* By Chas. H. Eldon. *Ibid.*, Nov. 27, p. 372.

2134. *Land Birds at Sea.* By George Shepard Page. *Ibid.*

2135. *The Chickadee for Public Parks.* By Hermit. *Ibid.* — *Parus atricapillus* said to have modified its habits under partial domestication.

2136. *Second Occurrence of the Red Phalarope at Monroe, Michigan.* By Robt. B. Lawrence. *Ibid.*

2137. *Food of the American Goshawk.* By W. L. Bishop. *Ibid.*, Dec. 4, p. 391. — *Bonasa umbellus.*

2138. *A Snowbird in a Crockery Store.* By J. L. Davison. *Ibid.* — *Junco hyemalis.*

2139. *The American Woodcock.* Editorial. *Ibid.*, Dec. 11, p. 411.

2140. *The American Woodcock.* By Gurdon Trumbull. *Ibid.*, p. 412. — Observations on feeding habits and notes in captivity.

2141. *A Skeleton of the Ivory-bill.* By R. W. Shufeldt. *Ibid.*, Dec. 18, p. 431. — *Campephilus principalis.*

2142. *Chinese Pheasants.* By J. F. L. *Ibid.* — Habits in Oregon.

2143. *Yellow Rail in Chicago.* By Korax. *Ibid.*

2144. *Evening Grosbeak in New York.* By Morris M. Green. *Ibid.* —At Ithaca, N. Y., Dec. 11, 1890.

2145. *The Woodcock's Whistle.* By William Brewster and U. S. G. White. *Ibid.*, Dec. 25, pp. 453, 454. — Controverting and confirming some of Mr. Trumbull's statements in No. 2042.

2146. *Snowy Owls.* By E. W. L. and 'Del. A. Ware.' *Ibid.*, p. 454.

[**Forest and Stream.**—Continued.]

2147. [*The notes of the Woodcock.*] Editorial. *Ibid.*, Jan. 1, 1891, p. 470.

2148. *The Woodcock's Whistle.* By Geo. A. Boardman and T. M. Aldrich. *Ibid.*, p. 472.

2149. *Surrounded by Snow Buntings.* By J. D[=L]. Davison. *Ibid.*

2150. *Snowy Owls.* By H. *Ibid.* — In Nebraska.

2151. *A Belated Woodcock.* By J. H. B. *Ibid.*, p. 475.

2152. *The Woodcock's Twitter.* By Gurdon Trumbull and W. *Ibid.*, Jan. 8, p. 491.

2153. *Japanese Pheasants in Oregon.* By W. A. Wilcox. *Ibid.*

2154. *The Curlew's Bill.* By Geo. A. Boardman. *Ibid.*

2155. *Chicago and the West.* By E. Hough. *Ibid.*, pp. 493, 494.— Contains some discussion of the vernacular names of Geese.

2156. *The Woodcock's Whistle.* By R. W. Shufeldt, Henry B. Nicol, and John Burroughs. *Ibid.*, Jan. 15, p. 511.

2157. *Mockingbirds Breeding in Massachusetts.* By E. H. Lathrop. *Ibid.*

2158. *Ivory-bills.* By W. E. Hudson. *Ibid.* — *Campephilus principalis.*

2159. *Perth Amboy, N. J.* By J. L. K. *Ibid.* — *Nyctea nyctea* and *Uria lomvia.*

2160. *The Woodcock's Whistle.* By H. Austin, A. H. P., J. Gantz, and J. S. M. *Ibid.*, **Vol. XXXVI**, Jan. 22, 1891, pp. 2, 3.

2161. *An Unseasonable Rail.* By Sinkboat. *Ibid.*, Feb. 5, p. 44. — *Rallus virginianus* in Maryland in January.

2162. *Florida Bird Notes.* By O. K. Chobee. *Ibid.* — At Biscayne Bay.

2163. *Maine Winter Birds.* By D. *Ibid.*, Feb. 12, p. 63.

2164. *Winter Rail.* By W. A. H. *Ibid.*, p. 64. — *Rallus elegans* and *Nyctea nyctea* in New York. See also *ibid.*, Feb. 19, p. 84.

2165. *Winter Robins in New England.* By C. H. G. *Ibid.*, Feb. 19, p. 84. — Contains notes also on *Nyctea nyctea.*

2166. *Pelican and Catfish.* By O. K. Chobee. *Ibid.*, Feb. 26, p. 104.

2167. *Song Sparrows Rearing Kingbirds.* By Reuben M. Strong. *Ibid.*, pp. 104, 105.

2168. *Winter Rail on Long Island.* By Alfred A. Fraser. *Ibid.*, p. 105. — *Rallus virginianus.*

2169. *Eider Duck on the Niagara.* By Eben P. Dorr. *Ibid.* — *Somateria spectabilis.*

2170. *Wilson's Snipe in Rhode Island.* By F. L. G. *Ibid.*

2171. *The Woodcock's Noise.* By H. Austen and Wm. E. Præger. *Ibid.*, March 5, p. 123.

2172. *Ways of the Ruffed Grouse.* By Dorp. *Ibid.*

2173. *Winter Robins in New England.* By J. W. G. *Ibid.*

2174. *Quail in a Skunk Trap.* By A. V. R. *Ibid.*, p. 124.

2175. *Evening Grosbeak in Pennsylvania.* By F. F. C. *Ibid.*

[**Forest and Stream.**—Continued.]

2176. *Early Woodcock.* By J. P. B. *Ibid.*, p. 126.

2177. *Drumming of the Grouse.* *Ibid.*, March 12, p. 148.

2178. *Snowy Owl in New York.* *Ibid.*

2179. *Snowy Owl.* By Woronoco. *Ibid.*

2180. *Doves Nesting in Trees.* By S. A. Ball. *Ibid.*, March 19, p. 167. — With notes on nesting of several other birds.

2181. *Dakota Game Birds.* By Elmer T. Judd. *Ibid.*, p. 169. — Chiefly Water Birds.

2182. *Whistling Up a Woodcock.* By John J. Harris. *Ibid.*, March 26, p. 187.

2183. *Harlequin Duck at Cohasset.* By E. H. Clark. *Ibid.*

2184. *Wild Geese.* By Richard Gear Hobbs. *Ibid.*, p. 188. — Causes of scarcity.

2185. *Wild Geese and Electric Lights.* By F. B. *Ibid.*, April 9, p. 227.

2186. *Sierra Nevada Notes.* By Arefar. *Ibid.*, p. 229. — Contains notes on *Merula m. propinqua* and other species.

2187. *Why the Grouse Drums.* By Dorp. *Ibid.*, April 16, p. 248.

2188. *Eagle and Jack Rabbit.* By W. L. J. *Ibid.*

2189. *Bird Notes from Missouri.* By Jasper Blines. *Ibid.*, April 23, p. 268.

2190. *Sounds of Woodcock and Snipe.* By H. Austen. *Ibid.*

2191. *The Ways of the Ruffed Grouse.* By Dorp. *Ibid.*, April 30, p. 290.

2192. *Puzzled Geese.* By F. L. B. *Ibid.*, May 7, p. 310.

2193. *The Ways of Snipe.* By Henry B. Nicol, M.D., *Ibid.*

2194. *The Drumming of the Grouse.* By Hermit. *Ibid.*, May 14, p. 327.

2195. *Downy Woodpecker or Sapsucker.* By Henry Stewart. *Ibid.*, May 21, p. 347.

2196. *A Sparrow-killing Crow.* By W. H. *Ibid.*, p. 348.

2197. *Indians and Wildfowl.* By J. W. Schultz. *Ibid.*, June 4, p. 391. — Destruction of Ducks and Geese in the far North.

2198. *Ruffed Grouse in Confinement.* By O. O. S. *Ibid.*, June 11, p. 411. — See also *ibid.*, July 9, p. 496.

2199. *Fulvous Tree Duck in Missouri.* Editorial. *Ibid.*, June 18, p. 435. — See also *ibid.*, July 2, p. 476.

2200. *Florida Hummingbirds.* By Didymus. *Ibid.*, June 25, p. 455.

2201. *Bird Notes from Takoma.* By R. W. Shufeldt. *Ibid.*, pp. 455, 456. — In the District of Columbia.

2202. *Pennsylvania Notes.* By H. *Ibid.*, July 9, p. 496.

2203. *Breeding of the Teal Duck.* By J. G. S. *Ibid.* — *Anas discors* near Geneva, N. Y. — C. F. B.

Publications Received. — **Allen, J. A.** On a Collection of Birds from Chapada, Matto Grosso, Brazil, made by Mr. Herbert H. Smith. Part I. Oscines. (Bull. Am. Mus. Nat. Hist., III, No. 2, pp. 337-380.)

Baur, G. On the Origin of the Galapagos Islands. (Am. Nat., March, 1891, pp. 217-226.)

Büttikofer, J. On a Collection of Birds from Flores, Samao and Timor. (Notes from Leyden Mus., XIII, pp. 210-216.)

Cherrie, George K. Notes on Costa Rican Birds. (Proc. U. S. Nat. Mus., XIV, pp. 517-537.)

Dresser, H. E. (1) Notes on Some of the Rarer Palæarctic Birds. (Ibis, July, 1891.) (2) On a Collection of Birds from Erzeroom. (*Ibid.*)

Fannin, John. Check List of British Columbia Birds. 8vo. pp. 49. Victoria, B.C., Sept., 1891.

Hartert, Ernst. Katalog der Vogelsammlung im Museum der Senckenbergischen Naturforschenden Gesellschaft in Frankfurt am Main. 8vo. pp. 259. Frankfurt a. M., Jan., 1891.

Jäckel, And. Joh. Systematische Uebersicht der Vögel Bayerns. 8vo. pp. xxiv+392. München und Leipzig, 1891.

MacFarlane, R. Notes on and List of Birds and Eggs Collected in Arctic America. (Proc. U. S. Nat. Mus., XIV, pp. 413-446.)

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GENERAL NOTES.

The Black Tern at Prince Edward Island.—As far as I can learn, the Black Tern (*Hydrochelidon nigra surinamensis*) has never been reported from the Atlantic coast north of Grand Manan Island, where three specimens were taken "in the latter part of August, 1879," as recorded by Mr. Ruthven Deane (Bull. Nutt. Orn. Club, Vol. V, p. 63). I have in my collection a young male of this species which I shot September 13, 1887, at Tignish, Prince Edward Island.—FRANK H. HITCHCOCK, *Washington, D. C.*

Calidris arenaria in Massachusetts in Winter.—While on a shooting trip at Nantucket Island, Mass., I saw on Dec. 13, 1891, a Sanderling which alighted for a moment within a few feet of where I was and then flew away. As I have before stated (Auk, VII, 294), some of these birds regularly winter in this locality.—GEORGE H. MACKAY, *Nantucket, Mass.*

Late Breeding of Columbigallina passerina. — On November 3, 1891, I saw a pair of Ground Doves just able to fly. They were accompanied by their parents. This species must breed regularly up to November, for on October 19, 1886, I took a set of two slightly incubated eggs on Sullivan's Island, South Carolina.—ARTHUR T. WAYNE, *Mount Pleasant, South Carolina.*

A Belated Migrant.—On November 26, 1891, I saw and positively identified a Bobolink (*Dolichonyx oryzivorus*). I had just shot a Wild Turkey, and had scarcely walked ten steps with the Turkey when, quite to my surprise, a Bobolink flew up from a patch of weeds. I could have easily shot the bird, but did not care to. Previous to November 26 the weather was very inclement, there having been ice four times.—ARTHUR T. WAYNE, *Mount Pleasant, South Carolina.*

Junco hyemalis in Eastern Massachusetts in June.—On May 23, 1891, I was much surprised to find a male Snowbird (*Junco hyemalis*) feeding in a pasture at some distance from my home, in company with two Chipping Sparrows (*Spizella socialis*). On May 27 he was in the same pasture, again in company with two Chippers. Owing to the distance, my next visit to the place was on June 7, when I found things going on as before. Evidently the Snowbird intended to spend the summer there.

June 13 Mr. Bradford Torrey accompanied me, and we then found the Junco engaged in feeding young birds in a nest looking exactly like a typical Chipping Sparrow's nest, placed in the crotch of a small limb of a red cedar some twelve feet from the ground. After waiting a few minutes we saw a female Chipper feed the same young, and then the case waxed exceedingly interesting, for it seemed to be one of interbreeding between birds of different genera. To our disappointment, however, a male Chipper finally appeared, who showed much interest in subsequent proceedings. But he never once brought food, while the Snowbird and female Chipper did so constantly. Any casual observer would undoubtedly have declared them the parents of the brood. When, at last, I climbed the tree to get a look at the young birds, Junco made far more protest than did either of the Sparrows; in short, during all our visit, he behaved precisely as the father of the young birds would naturally do.

Of course we decided to obtain the young when they should become of proper size and plumage. But this proved impracticable. The birds got out of the nest, and although I with others saw the Snowbird feed them repeatedly after this, we were unable to get one of them for examination. It must be said, however, that, so far as we could observe with the aid of

a good glass, they looked exactly like ordinary young Chipping Sparrows.

Junco remained in the same vicinity during all of June, being seen on several dates, as also being heard to sing freely; he was also seen July 14. Whenever seen he was invariably accompanied by several Chippers, probably the two adults and the family of young. In August I sought him vainly. Repeated search failed to reveal him, and at last I gave up the quest.

The gist of the story is this: *Junco hyemalis* haunted one field in this town from late in May until the middle of July; during part of this time he assisted in feeding a brood of young Chipping Sparrows. Whether he was the real father or only the godfather of these young Sparrows is an interesting question which, I deeply regret to say, I cannot answer.—E. F. HOLDEN, *Melrose, Mass.*

Distribution of the Species of Peucæa in Cooke County, Texas.—The eastern third of the county is covered with timber, principally post oak and black jack on the upland, with hickory, ash, and elm on the streams. The soil is sandy. In this timber belt is found *Peucæa æstivalis bachmanii*. I have never seen this bird in this county in winter.

The central part of the county embraces the Grand Prairie, which is undulating and slopes gently to the southeast, the underlying chalky limestone producing a rich, stiff, almost black soil, and forming an escarpment to the north and west. In this prairie only have I found *Peucæa cassini*. It is only seen during the breeding season, and it is then of irregular occurrence.

Under the scarp of the above-described limestone is a sandy soil grown with post oak and black jack, but in a dwarfed condition, while there is a growth of bramble (chaparral) not seen in the eastern portion of the county. In this part of Cooke County alone have I seen *Peucæa ruficeps eremœca*. I have seen the young on the wing on May 31, and have also seen one pair on December 27.

All three have distinctive songs, but only *cassini* sings on the wing, and it does not always do so. I once shot one singing in the crack of a worm fence.—GEO. H. RAGSDALE, *Gainesville, Texas.*

Thryothorus ludovicianus in Massachusetts.—On September 27, 1891, I shot in my garden in Cambridge, Mass., a Carolina Wren. The bird was an adult male and was in fine condition. He had been in the neighborhood for nearly a week and possibly longer, and was frequently to be heard calling or singing. The spot seemed to be to his taste, for my own and the adjoining gardens afford an abundance of shade trees and shrubbery, while, separated only by a high board fence, is an extensive pile of firewood and odds and ends of lumber the attractions of which he seems to have been the first to discover.

As far as I am aware this species has been captured in New England, beyond the limits of the Carolinian fauna, but three times before: at

Brookline (Nov. 4, 1883) and Lynn, Mass. (July 6, 1878), and at Rye Beach, N. H. (Aug. 7, 1880). In the present instance the habits of the species, as well as the absence of violent storms for some time previous, preclude all idea of the bird's having been swept away from his home and dropped here by some cyclonic gale. In all probability it was simply a case of that restless spirit of wandering that takes possession of most 'non-migratory' species in the autumn, and which is very likely the surviving remnant of a former habit of migration in such species.—C. F. BATCHELDER, *Cambridge, Mass.*

Notes from Springfield, Massachusetts.—November 14, 1891, I captured on the Connecticut River near Springfield an adult male *Aythya collaris.* Occasionally in autumn a small flock of this species will locate their feeding grounds in this vicinity and remain a month or so, but as far as my experience goes they have heretofore been young birds.

During the first half of November, the most common Duck about here was *Dafila acuta;* this was something quite unusual. One day I was one of a party that captured nine specimens, and we could easily have taken more if we had cared to do so. There were a few *Anas obscura* in company with the *Dafila acuta*, instead of the reverse as is usually the case if any of the latter kind are in this locality.

From the 28th day of last August until about the 20th day of September a water bird, which I suppose to have been a Clapper Rail, located itself and remained among the wild oats that grow on the muddy banks of the Connecticut River upon the shore directly opposite the city of Springfield. During calm days the call of the bird, which very much resembles that of the common Guineahen, could be distinctly heard from this side of the river, a distance of more than a quarter of a mile. All my attempts at capture failed, although I approached within a few feet of the bird. I know of but one Clapper Rail having been taken in this vicinity.

While shooting from a blind this fall, a Wood Duck stopped and fluttered over the decoys, and while in that position, like a flash, a Sharp-shinned Hawk flew and fastened itself upon the back of the Duck, when both were shot. I relate this incident to show the ferocity and boldness of this little Hawk.

A pair of Mockingbirds, whose presence in West Springfield I have heretofore recorded, passed this their fourth successive season in the same locality in that town.—ROBERT O. MORRIS, *Springfield, Mass.*

NOTES AND NEWS.

AUGUST VON PELZELN, an Honorary Member of the American Ornithologists' Union, died at Oberdöbling, near Vienna, on the 2d of September, 1891, in the sixty-seventh year of his age. Owing to failing health

he had recently resigned the position of Custos of the Imperial Museum at Vienna, where for forty years he was in charge of the collections of mammals and birds. He had for a long period been recognized as one of the leading ornithologists of the world, and an especial authority on the birds of Brazil. Although the author of a long list of minor papers and essays, his best known work is doubtless the invaluable 'Zur Ornithologie Brasiliens,' published in parts, 1868-71, based on the collections made by Johann Natterer during the years 1817 to 1835, representing 1200 species and numbering over 12,000 specimens. He also published extensively upon mammals, particularly those of Brazil, collected by Natterer.

Captain Thomas Wright Blakiston, R. A., one of the original Corresponding Members of our Union, died in San Diego, Cala., on October 15, 1891, from pneumonia.

To ornithologists Capt. Blakiston was best known for his invaluable contributions to the knowledge of the avifauna of Japan, and it is safe to say that no one man has done so much towards the thorough understanding of the ornithology of that interesting country. During a sojurn of twenty years in the northernmost island of Japan proper, Yezo, he was enabled to give a nearly exhaustive list of the regular visitors and residents of that hitherto almost entirely unknown island, introducing an entirely new feature in the Japanese avifauna, viz., the Siberian, and demonstrating the fact that the dividing line between the Manchurian and the Siberian subregions of the Palæarctic region is formed by the Strait of Tsugaru which separates Yezo from the main island. This zoögeographical line has justly been termed 'Blakiston's line' in recognition of his valuable work.

After having collected material for a full understanding of the zoögeographical position of Yezo, he in conjunction with Mr. Pryer in 1879 issued the first catalogue of the Birds of Japan that lays claim to an approach to completeness, as the list of the 'Fauna Japonica' only comprises the birds of the extreme southern part of Japan proper. In 1880 a new list was published, a revised edition of which was again printed in 1882. The latter is practically the foundation of all future work in Japanese ornithology. It is *the* 'Check List' of Japan.

It was not only the geographical distribution pure and simple that attracted his attention. With true scientific tact and accuracy he investigated the changes of plumages, the migrations, and the habits of the birds he came in contact with, and many an intricate question has been solved which without his untiring energy and loving understanding would have remained unsolved to this day.

Blakiston was not a 'professional' ornithologist; he was an amateur in the best sense of the word, for he was scientific in his methods and aims as only few of even the professionals. But he was an amateur in this that his motive was a most unselfish love of truth and his science. He did not pursue his studies for the 'glory' they might bring him, but in order to satisfy his thirst for knowledge. Nor did he, while working out the details, lose sight of their connection with the whole. Unlike most

amateurs he appreciated that the knowledge of distribution, migration, habits, etc., is not the ultimate aim of his science, but that these details are only valuable in so far as they assist in ascertaining the laws and history of the whole living world, of life itself.

In strict conformity with the scientific spirit that characterized all his doings were the modesty and generosity of the man. Always willing to help and to give, never jealous of anybody 'stealing his thunder,' but on the contrary, openhearted and openhanded, giving out of his stores both of knowledge and material without expecting or claiming 'returns' or 'credit.' And because men of Captain Blakiston's stamp are so scarce his loss is felt more deeply by those who had the good fortune to know him and to profit by his nobleness of heart and mind.

We have not space to enumerate all the various papers published by him on the birds of Japan. The principal ones have been alluded to above, and to these we would add the title of a very interesting paper read by him on February 14, 1883, before the Asiatic Society of Japan, viz: 'Zoölogical Indications of Ancient Connection of the Japan Islands with the Continent.'

The following species were named in his honor:—*Alauda blakistoni; Anthus blakistoni; Areoturnis blakistoni; Arundinax blakistoni; Bubo blakistoni; Chelidon blakistoni; Motacilla blakistoni.*

Captain Blakiston was born at Lymington, Hants, England, December 27, 1832. He received his education at the Royal Military Academy, joined the Royal Artillery, and served during the Crimean War. At the end of the latter he was sent to Canada where he was detailed to join the Palliser Expedition for exploring the country between Canada and the Rocky Mountains. The winter of 1857-58 was spent in Hudson's Bay Territory and in Western Canada, and during the following summer he crossed the Rocky Mountains twice. The ornithological results of his wanderings in the Fur Countries are embodied in two valuable papers, published in 'The Ibis' for 1861, 1862, and 1863, entitled 'On the Birds of the Interior of British North America,' which are still the main source of our ornithological knowledge of these parts of our continent. In 1861 he surveyed the middle and upper Yangtse-Kiang, for which work he received the Royal Medal of the Royal Geographical Society. Shortly after he left China for Japan, where, after a brief visit to England, he settled in Hakodate, engaging in mercantile pursuits. In his spare time he engaged in his favorite studies, exploring and surveying a then almost unknown country and people. In 1884 he retired from business and came to this country where he settled and married Miss Dun of London, Ohio.

Captain Blakiston collected extensively. His Canadian collections went to Woolwich, England; quite a number of Japanese birds he sent to R. Swinhoe, while a great many more were given to the local museum in Hakodate, but the remainder of his valuable collection he donated to the United States National Museum, where it forms the nucleus and most valued portion of one of the most extensive collections of Japanese birds in existence.—L. STEJNEGER.

SUPPLEMENT.

THE INHERITANCE OF ACQUIRED CHARACTERS.

President's Address, Delivered at the Annual Meeting of the American Ornithologists' Union, New York, Nov. 18, 1891.

BY D. G. ELLIOT.

COLLEAGUES:—I desire at this time to bring to your notice a subject that does not seem to have greatly occupied the attention of ornithologists, although it has been the cause of much discussion among others prominent in different branches of science, and is so important that it strikes at the very root of the principles of evolution, and the causes that effect the variations exhibited by living creatures. This subject is comprised in the question, "Can acquired characters be transmitted by a parent to its offspring?" A school has arisen, under the leadership of Prof. August Weismann, of Freiburg University, which denies that acquired characters can be transmitted by their possessor, but attributes all variations that occur to the principle of natural selection, and Weismann asserts* that the inheritance of acquired characters has never been proved, either by means of direct observation or by experiments. This theory is of course in direct opposition to Lamarck's fourth law which those who do not agree with Prof. Weismann, accept as explaining their belief. This law, freely translated is as follows: "All that has been acquired, impressed, or altered in the organization of individuals during the course of their life, is preserved by generation, and transmitted to the new individuals which spring from those who have experienced these changes." Of course we receive this statement with a reservation, for it is not to be presumed that *all* characters, but only such would be transmitted, as would be necessary for the preservation or well-being of, or would be advantageous to, the offspring. Before discussing this subject it is very necessary to

* Essays upon Heredity, 2d ed. p. 81, English Translation.

ascertain what is meant by the expression "acquired characters." Weismann* defines these, as "no more than local or sometimes general variations which arise under the stimulus provided by certain external influences." Prof. Ray Lankester,† one of the most ardent as well as aggressive of Weismann's followers, explains the term as "new characters acquired by the parent as the direct consequence of the action of the environment upon the parental structure, and exhibited by that parent as definite measurable features."

Mr. Dyer‡ gives his view of this expression, in perhaps not quite so lucid a manner, as follows: "Acquired characters are those changes of hypertrophy, extension, thickening, and the like, which are obviously due to the direct physical action of the environment on the body of the individual organism." I would define this term, as seems most reasonable to me, as follows: Acquired characters are differentiations due to any cause, known or unknown, assumed by an individual or individuals during life, which render it or them recognizable as varying from the ancestral form. I do not profess to be able to produce proofs that are absolute, and show causes for these variations which may not be explained away by some unexplainable theory, any more than have Weismann and his followers been able to bring forward any that absolutely prove the position they have assumed to be correct, but I think evidence can be given, that may be called strongly circumstantial, if not direct, to show that characters have been acquired and then transmitted by a parent to its offspring. We will first consider the causes that, as has been asserted, produce these variations, and then cite some of the cases that would seem to show direct evidence of the power some of these causes, at least, have exerted in influencing these variations, and of their transmission from the parent to the offspring.

Weismann and his followers, as has been stated, assert that natural selection is all-sufficient to explain these phenomena. What is natural selection? For a reply I turn to Darwin, the originator of this theory, and read as follows: "The preservation of favorable variations, and the rejection of injurious varia-

* Essays, p. 171.
† Nature, 1890, p. 315.
‡ Ibid. 1889, p. 128.

tions, I call natural selection.*....Some," he states, "have even imagined that natural selection induces variability, whereas it implies only the preservation of such variations as occur, and are beneficial to the being under its conditions of life"; and he farther says,† "unless profitable variations do occur, natural selection can do nothing"; also,‡ "unless favorable variations be inherited by some at least of the offspring nothing can be effected by natural selection," and this is reiterated farther on,§ "nothing can be effected unless favourable variations occur," and he goes on to say‖ "what applies to one animal will apply through all time to all animals — that is if they vary — for otherwise natural selection can do nothing." It will thus be seen that the author of this doctrine expresses himself in the most positive terms that the principle does not originate variation, but on the contrary is only effective when variation arising from some other cause has been produced. Let us consider some of the causes which, from the results, lead us to believe that they have originated variation, and first among these is environment. Darwin paid little or no attention to the influences of this cause, and in his letter to Moritz Wagner he says: "In my opinion the greatest error I have committed has been not allowing sufficient weight to the direct action of the environment, that is food, climate, etc., independently of natural selection. Modifications thus caused, which are neither of advantage or disadvantage to the modified organism, would be especially favored, as I can now see, chiefly through your observations, by isolation in a small area, where only a few individuals live under nearly uniform conditions. When I wrote the 'Origin of Species,' and for some years afterwards, I could find little evidence of the direct action of the environment. Now there is a large body of evidence."¶ It is, I think, the general belief, of ornithologists at all events, that a form to be successful in attaining a new development, must be isolated from other forms. This would seem to be self-evident; otherwise an individual that

*Origin of Species, 3d ed. p. 84.

†Ibid. p. 86.

‡Ibid. p. 107.

§Ibid. p. 114.

‖Ibid. p. 119.

¶Darwin's Life and Letters, Vol. III, p. 159.

should begin to vary from its type, no matter what its cause might be, would almost certainly have those variations extinguished by interbreeding with typical individuals. A reasonable supposition, why such individuals as above mentioned should be able to perpetuate their variations or acquired characters without isolation, would be that the influences producing the characters were so powerful as to extend over and include the majority of the members composing the group affected, and then it would naturally follow that the original type would gradually disappear (the same influences continuing with undiminished force), to be succeeded by the new form, which in its altered condition would be more fitted, as we may believe, to battle with its changing surroundings.

It is perhaps well that, before proceeding farther, I should here explain what I mean by 'type' and 'typical' forms, as those terms will be used by me frequently. Type simply denotes the *starting point*. Thus an individual first described is the starting point in our literature of what we call a species, with which all subsequently discovered forms are to be compared. The form represented by this individual may not be, and probably is not, the original source from which all its varieties have sprung, but merely, mainly from accidental circumstances, was first brought to our notice. Thus *Cyanocitta stelleri* is the type of its particular group, and it is customary to compare the allied forms with it. It does not follow that because the bird we recognize under this name was described first, that it was the source from which its races derived their existence, as one of the forms we call subspecies may just as likely have been the origin of all the races, *C. stelleri* included, but the latter, having been first known, is the starting point or 'type.' 'Typical' is that form which identically represents the type.

Weismann,* referring to environment, says, "I only know of one class of changes in the organism which is with difficulty explained by the supposition of changes in the germ; these are the modifications which appear as the direct consequence of some alteration in the surroundings," and he declines to consider the subject in detail because facts of sufficient precision are not known for a final verdict to be pronounced. But it may be seriously doubted if Prof. Weismann has been able to produce more facts

*Essays, 2d ed. p. 99.

of "sufficient precision" to prove the theory he advocates than those who as yet decline to accept his views can bring forward as practically substantiating their position. Neither side has proofs that can demand the pronouncing of a final verdict, and we can consider only which evidence produced is most likely to show the true solution of the problem.

Some of the evidence of variation produced, as we believe, by environment and isolation may be derived from various genera of birds containing numerous species with a wide dispersion, and of these I would cite *Ptilopus*, a genus of Fruit Pigeons. These birds are chiefly inhabitants of islands, and intercourse between them is impossible on account of the intervening sea. As an example of variations that are produced, I will select as a type *Ptilopus melanocephalus*, a thoroughly characteristic and well-marked form, known to and accepted by ornithologists as a species, and which is an inhabitant of Java, Lombock, Sumbawa, and Sulabessie. In the neighboring island of Flores is a form *Pt. melanauchen*, varying but slightly from the type as if just commencing to differentiate. To the north in the great island of Celebes is another variation called *Pt. melanospilus* differing in a narrower throat mark, and in having the crissum lemon-yellow washed with orange, instead of clear yellow. Sula and Ceram possess another form which has the occipital black band (present in all the forms cited) smaller, and the crissum orange yellow; and lastly in the island of Sanghir, farthest away, *Pt. xanthorrhous* is found, which has both abdomen and crissum orange, this color running upwards nearly to the breast, thus exhibiting the widest divergence from the type. It will be seen from this distribution that, as might have been expected, the variations in the forms living nearest to the type, and consequently with less change of environment, are the slightest, while as the separation becomes greater these differences are more pronounced, until in Sanghir appears a form which has departed so greatly from the type as to merit specific rank.

The probable cause of these differentiations in the members of *Ptilopus* may be explained as follows. The islands of the Eastern Archipelago doubtless are but the remains of what was once a continent, and this was not broken up simultaneously or always suddenly in its length and breadth, but sometimes gradually and at various periods. Therefore we should not be surprised that

one species should inhabit various islands, between which are others containing distinct forms of the same genus. This may be accounted for in two ways. First, a species may have been widely dispersed over the continent; and when portions of this had disappeared beneath the waves, the fragments that remained above water at the outset were all inhabited by the same species; but the physical and other conditions of the environment at intermediate points were of a different character from those at the extremes, and in course of time the individuals, influenced by their environment, isolated on intervening islands, departed from their types, while others, though widely separated, retained their characters. Or, second, it may have been, on the breaking up of the continent, a portion of this inhabited by a strictly local form, but one surrounded by a more widely disseminated and typical species had not been submerged. This might explain the fact of why a distinct form should intrude itself on an island lying between others inhabited by a different one, the species with the greater range having been preserved at the extremes of its habitat which also had become islands. Thus isolation and environment had fulfilled their work, but the form remained true to its type, except where the environment had been changed.*

Other groups in the same genus present similar gradations of change and typical departures, but the above is sufficient for the present illustration. Now what has caused this variation? If, as we may suppose would be asserted by Weismann and his followers, it has occurred through natural selection and not by the parent transmitting its acquired characters to its offspring, how did the principle named act, if the environment was not sufficient to influence the change? Weismann acknowledges that the *germ-plasm*, that is, what he designates as the undying part of the organism contained in the germ-cells, may itself be modified through the action of the environment on the *soma*, that is, the body, increasing its nutrition, yet he denies that definite changes induced in certain parts of the *soma* by the action of the environment can be transmitted to a suceeeding generation. If, as granted by Weismann, the so-called 'immortal' part of the organism can be changed or modified by the influences of the environment, is it not reasonable to suppose that such modifications

*In this connection see Baur, 'Origin of the Galapagos Islands,' Am. Nat. 1891, p. 107.

would be exhibited by the germ-plasm upon the body of the individual's offspring, or must we believe that a modified or changed germ-plasm would produce the same results on succeeding generations that it did before it was altered from its original condition, no matter what the causes may have been to effect such modifications? But if such a modified germ-plasm did produce a modification in the offspring as presented by its parent, would not that be a transmission of acquired characters caused by the environment and not by natural selection?

If the influences of environment affect only the cells of the body, and these are unable to affect or modify the reproductive cells, would it not naturally follow that the offspring of an animal that was first changed by its environment, would not resemble its changed parent, but on the contrary would be what that parent was before it had acquired any new characters, and then the young would have to undergo in its life similar changes to those the environment had produced in its parent, and this would always be the case throughout all the generations of that species? In the young would always be produced the original appearance of the parent, never its alterations. But this, of course, is not so. The young bears a very close resemblance to its parent in the majority of instances, else the continuity of specific forms would be an impossibility. It is difficult to believe that the germ-plasm could be predisposed to all the infinite variations exhibited by the body in the many and totally different influences of its environment, and that the somatic cells exerted upon it no influence whatever. "If the body of the multicellular organism is thus, even according to Weismann's ideas, of secondary importance in comparison with the germ-plasm, if the latter corresponds to the unicellular organism, it follows that the multicellular is just as immortal or mortal as the unicellular. And thus it is impossible to see why, between the germ-plasm of the multicellular on the one hand, and that of the unicellular on the other, there should exist this profound difference, that the latter acquires characters during life and transmits them by heredity, the former not, — how the former any more than the latter can nourish itself and grow without being influenced in its nature by its nurture."*

*Eimer, Organic Evolution, p. 71.

The germ-plasm, according to Weismann's theory, can produce body-plasm, but the latter can never originate germ-plasm. Germ-plasm is continuous, undying, the body-plasm is mortal. On this point Prof. Lloyd Morgan* remarks, "I cannot but regard his doctrine of the continuity of germ-plasm as a distinctly retrograde step. His germ-plasm is an unknowable, invisible, hypothetical entity. Material though it be, it is of no more practical value than a mysterious germinal principle. By a little skilful manipulation, it may be made to account for anything and everything. . . . . The fiction of two protoplasms, distinct and yet commingled, is, in my opinion, little calculated to advance our knowledge and comprehension of organic processes. For myself I prefer to stand on protoplasmic unity and cellular continuity."

Mr. Lucas† has shown how the change of habit in certain birds of the island of Guadalupe, due to their insulation, illustrates certain facts affecting skeletal variation. The descendants of migratory species having their habitat restricted, show the symptom of weakening flight in the decrease in the length of the sternum; later on a diminution in depth of keel takes place. Then follows a reduction in length of wing, beginning with the manus and fore-arm, the humerus apparently not being affected, until the rest of the wing is perceptibly lessened. Then the outer wing bones disappear, leaving only the humerus,—as in *Hesperornis*,—and finally the humerus itself may be wanting, as in *Dinornis giganteus*. But there are exceptions to this, and one is exhibited in *Salpinctes guadalupensis* which has gained in power of flight, both the wing and sternum exceeding in length those of the continental form, and this would seem to indicate that insulation does not necessarily cause degeneration. Mr. Bryant had shown that this Wren had become the most abundant species on the island, and in ten years had exhibited a slight increase in length of bill; and Mr. Lucas argues that in this species superior wing power would give superior ability to obtain food, to escape its enemies, and to prevent its being blown out to sea, and a superiority in these points would naturally lead to its increase. Why this bird should be an exception to the others on

*Anim. Life and Intell. p. 141.

†Auk, 1891, p. 218.

the island may be due to the fact that *Salpinctes*, being a genus whose members are feeble in flight, required a greater development of wing and sternum to place it on a par with other species whose wing power was naturally sufficient to successfully combat the influences of insular life, and which *Salpinctes* alone lacked.

But to draw my illustrations solely from island forms, may be objected to on the ground that the influences there exerted are more powerful and exceptional than in other geographical areas which have environments not so abruptly separated. I will therefore cite the effects we assume continental environments have upon a form of wide distribution, and take for my illustration the familiar species *Melospiza fasciata* Gmel. and its allies. This species and its subspecies are distributed throughout North America from the Atlantic to the Pacific, and from Mexico to Alaska, and its islands. The type is found in the form inhabiting the eastern States, and extends its range to Nebraska and Indian Territory, and is generally constant in its characters, the variations being scarcely noticeable, as would be expected from the similarity of the environment throughout this dispersion. New Mexico and Arizona present a form, *M. f. fallax*, that varies from the type in its extreme pale coloration and increase of size. This region possesses climatic influences of an arid character, very different from that with which the type has to contend, and in certain portions of the habitat, as in the region of the Gila River, these influences cause individuals to exhibit markedly different characters from those observed in the type. In Colorado, Utah, Nevada and northward occurs another form, *M. f. montana*, which in winter visits the neighborhood of Tucson in Arizona. This is darker in color than *fallax*, as might be supposed it would be from the greater humidity of its habitat, but the two forms seem to run into one another on the northern and southern limits, respectively, of their dispersion, and individuals thus intermediate present characters that are inconstant, and which are probably the result of interbreeding. The foothills of the Sierras, through the mountains, and in their western foot-hills, produce another departure from the type, *M. f. heermanni*, and here we have a form of a much darker shade of brown, and bill intermediate in size between those of the two forms first mentioned. In the neighborhood of Comondu, in Lower California, the physical conditions have differentiated

another group, *M. f. rivularis*, distinguished from its New Mexico and Arizona relatives by darker color and greater size. Northward along the Pacific coast to the Columbian region another style is produced (*M. f. samuelis*), almost black in its coloration, and the smallest in size of all the subspecies. In the Columbian region a race, *M. f. guttata*, occurs, rufescent in hue, and with the bill more slender in porportion than any of the forms already mentioned. The typical home or central region of the dispersion of this form is the Columbia River region coastwise, but before reaching this point changes of an intermediate character in the color of plumage among individuals occur, foreshadowing the subspecies that ranges through the coast region of British Columbia, northward to Sitka. Thus migrants obtained in the fall and winter at Nicasio,* near San Francisco, are intermediate in coloration between the Pacific coast subspecies and that of the Columbian region, and individuals from the base of the eastern slope of the Cascades in Oregon exhibit gradations from that form which connect it by insensible stages with the subspecies of the Columbian region, *M. f. guttata.*

What is to be gathered from this mass of indisputable evidence, save that the variations of this widely dispersed form are caused primarily by the effects of environment, carried on, if you please, by natural selection, but not originated by it. The allied forms change with the localities they frequent. The different kinds of food, aridity, humidity, the elevation and depression of the earth's surface, producing mountain ranges and valleys, of various heights and depths, in short the many and potential physical and climatic influences that constitute what we call environment, have separately or together produced the various forms now existing, and that the characters acquired through these influences have been transmitted from parent to offspring. The various forms are isolated in the centre of their dispersion, as if on islands, from their allies, and when two of these are connected in the outlying portions of their dispersion, where the environment exerts influences derived from both neighboring regions, a new form is prevented from arising by the interbreeding of the two subspecies, even though the environment in the intermediate region could exert, if isolated, sufficient influences to produce and maintain

*Henshaw, Bull. Nuttall Ornith. Club, 1879, p. 159.

another subspecies. It seems to me this deduction from the evidence is reasonable and more probable than to suppose that the germ of these various forms had a predisposition in some ancestor to produce them. We cannot actually prove that environment has caused these changes, with any more certainty, perhaps, than the theory of germ predisposition can be proved, but this we do know, that desert tracts contain light-colored species, and forests and districts with great rainfall have dark-colored species, and it is a fair assumption that these great differences are caused by environment; and granting this, have we not an explanation of causes of variation, in some degree at least?

Additional evidence of the presumed effects of environment in another genus of birds could be produced from Mr. Dwight's exhaustive paper on *Otocoris* or Shore Larks, with which you are all familiar, but my time is too brief to consider this portion of my subject any further. If natural selection were all sufficient to produce variations in any particular species, it is reasonable to suppose that it would effect such changes in others under the same environment. But our evidence seems to point the other way, and that environment causes variations, and natural selection only assists in their transmission.

The effect of climatic influence is shown in the changes exhibited by the blue butterfly, *Lycæna agrestis*.* This occurs in three forms. A and B alternate in Germany as winter and summer forms; B and C are the winter and summer forms in Italy. The form B occurs in both climates, but appears in Germany as the summer, in Italy as the winter, form. The German winter form A, however, is completely wanting in Italy, while the Italian summer form (var. *allous*) does not occur in Germany.

Duration of life, among individuals, we also regard as a prominent factor in the development of species, and cause of variation; and the longest-lived creatures evolve new forms or variations the slowest. This would seem to be almost paradoxical, for it would appear that the longer an animal was exposed to the influences of its environment the more its immediate offspring would be impressed by and illustrate those influences. This might be so if reproduction and development were equally rapid in all creatures. But of course this is not so. The longest-lived creatures produce the fewest young, and naturally maturity is

*Eimer, Organic Evolution, p. 126.

slow in arriving. It is difficult to ascertain the age to which wild creatures are capable of attaining, but as the results of our only means of observation, viz., animals in captivity, it is found that Eagles live nearly one hundred years.* Ravens live nearly as long. Parrots have reached nearly one hundred years. Magpies live twenty years, and small birds, as the Nightingale, Blackbird, etc., from ten to twenty years. As a rule birds of long lives lay but few eggs at a time, and allowing for the destruction of the eggs from numerous causes, and the mortality among the young, it is estimated by Weismann,† arguing on the lines of Darwin and Wallace, that given the fertility and average of life of a species, a calculation can be made of the number of those reaching maturity. A species living ten years and laying twenty eggs each year, only two of its young in that time will reach maturity, if the number of individuals in the species is to remain constant. Or if the duration of life of an eagle is sixty years, and it reaches maturity at ten years, and then lays two eggs a year, out of the one hundred eggs laid only two will develop into adult birds. Weismann considers that this calculation rather underthan over-estimates the proportion of mortality among the young. However this may be, or whether we may altogether accept his calculations as correct, or warranted by recorded data, it appears to be a recognizable fact that the greater the age of an animal the slower it reproduces, and is the less able to originate divergences from those characters it received at its birth. The influences of the environment would be slower in their effects on a long-lived individual, and changes from its type, or starting point, correspondingly delayed. We must therefore look for variations and departures from the types more among those species with shorter lives, and greater number of offspring, where the influences of environment and natural selection are able to produce their legitimate effects in the briefest periods of time.

What is the result of the effect of environment on individuals? It provides them with the means of succeeding in the struggle for life. Dwellers of deserts, or desert-like districts, are pale in coloration and assimilate the ground, and so escape detection. Humidity and rainfall cause a melanistic phase of plumage,

* Brehm, Leben der Vögel, p. 72. Weism. Essays, p. 37.

† Duration of Life, Essays, 2d ed. p. 13.

witness the birds of Florida or those of the Northwest Coast, as compared with similar forms in drier sections of our country, and evidence is given upon this point in 'The Entomologist' as stated by Cockerell* that moisture is the cause of a certain phase of melanism, especially among lepidoptera. We may believe that the climatic changes of boreal regions influence the appearance of animals that are found within their limits, witness the white covering, affording, during the lengthened winter, an additional means of protection through concealment amid snow and ice. All such evidence strengthens us in the belief that the environment originates variation. Additional evidence of this I obtained in the clever paper† of my friend, Mr. F. M.Chapman, on a collection of birds from British Columbia, obtained on the coast and in the interior. The former is visited by a rainfall heavier than that observed in any other portion of North America, resulting in a dense forest-growth; the interior has a minimum of rainfall and vegetation comparatively desert-like in character. "The effect of this rainfall is the production of forms that are darker, more richly colored, or more heavily barred or streaked than any other representative of their respective genera." As a proof of this, thirty-one birds are enumerated from the coast, all of which present these distinguishing characters, when contrasted with their representatives from the interior, which are paler in every instance.

An acquired character resulting from the influence of environment will be inherited as long as the causes that produced it remain the same, but will be extinguished or changed with a changing environment, provided sufficient time has not elapsed for the character to become fixed. In the latter case heredity would probably cause the appearance of the character for several generations at least, even under a changed environment. Baur‡ has shown that Hoffman by isolating the wild carrot and bringing it under different conditions changed it considerably, and this change was inherited. Alpine plants removed to a botanical garden acquire new characters. The green Parrot (*C. festiva*),

* Nature, Feb. 27, 1890.

† Bulletin Am. Mus. Nat. Hist. III, No. 1, 1890, p. 127.

‡ Amer. Nat. 1891, p. 312.

as mentioned by Darwin,* when fed with the fat of siluroid fishes became variegated with red and yellow feathers, and the natives of Gilolo, in an analagous manner, alter the colors of the *Lorius garrulus* into the *L. rajah*. These characters will reappear if the causes that produced them continue, but not otherwise. The effect of food is illustrated in bees. The larvæ of worker bees, royally fed, develop into queens; and the workers raise queens when from any cause these are not present in the hive. The faculty enabling the workers to attain the wisdom to accomplish this cannot be inherited from their parents, queen and drone, but must exist in germ in worker larvæ, and be developed into mental characters either of queen or workers, according to the nourishment provided. This can only be explained by the inheritance of acquired characters, and by correlation, and not by the continuity of the germ-plasm, or by panmixia.†

In his essay on heredity Weismann asserts‡ that "from an Eagle's egg an Eagle of the same species is developed, and not only are the characteristics of the species transmitted to the following generation, but even the peculiarities. The offspring resemble the parents among animals as among men"; and again in the same essay, when speaking of the reproductive power of the germ-cells, he says: "Each of these can, under certain conditions, develop into a complete organism of the same species as the parent, with every individual peculiarity of the latter produced more or less completely." This is the position he would naturally take for his line of argument, and although those who differ from his views, might and do agree with him to a certain degree, they are not willing to go with him to the full extent such assertions would naturally carry them. Like does beget like, but not always. There are restrictions. It does in the sense that an Eagle can only produce an Eagle, and not a Swan, and a Grouse can only produce a Grouse, and not a Crow, but both forms can and do often produce young that vary from their parent in essential characters, such as color of plumage, size, and other attributes that form their complete organization. If this were not so, if like only could beget like, in its restricted sense,

*Animals and Plants. Domest. II, p. 269.

†See Eimer, Organic Evolution, p. 267.

‡Essay, pp. 72, 73.

there could be no advancement towards a more perfect development, and the creature of today would be the same creature it was at its creation, and it would remain the same throughout its existence. John T. Gulick* has defined this principle in a manner that seems most satisfactory, and nothing that I have yet seen advanced by the advocates of natural selection as the all-sufficient cause, is able to controvert his conclusions. Mr. Gulick explains: "1st. Unlike to unlike, or the removal of segregating influences, is a principle that results either in extinction through failure to propagate; or in the breaking down of divergences through free crossings. 2d. Like to like, when the individuals of each inter-generating group represent the average character of the group, is a principle through which the stability of existing types is promoted. 3d. Like to like, when the individuals of each group represent other than the average character of the group, is a principle through which the transformation of types is effected."

In exemplification of these principles this author illustrates them somewhat in this way. Sexual and social instincts often bring in groups like to like together that do not cross, and when the different groups occupy the same area, and are guided by the same habits in the use of the environment, divergences occur even without a diversity of natural selection. He farther explains the way in which this divergence arises. A partial change of plumage or development of plumes results from a local segregation; and through social segregation, the principle that causes animals to associate with those whose appearance has become familiar to them, these variations are prevented from being submerged by intercrossing. Then when the invisible instinct and visible character lead individuals thus characterized to associate together, the new characters are intensified, because any individual of the community not imbued with the desire to remain with animals thus changed, will stray from them and fail to breed. He calls this process social selection. Then sexual selection steps in and preserves and accumulates peculiarities of color or plumage, for any individual deficient in these characteristics would be less likely to breed and produce offspring. He concludes as follows: "Varieties thus segregated may often develop divergent habits in

* Nature, XLII, 1890, p. 536.

their use of the environment, resulting in divergent forms of natural selection, and producing additional changes, but so long as their habits of using the environment remain unchanged, their divergencies cannot be due to natural selection." From these deductions, it is very obvious that we can only accept the dogma that 'like begets like,' with reservations. The offspring may be like its parent, but not always, nor in all respects. There are too many and too complex influences at work to hinder and prevent this. Natural selection cannot prevent a character from diverging from its accustomed path, and subsequently reappearing with modifications. Nothing, I believe, has yet been adduced to prove that natural selection can cause variation; it is merely the vehicle by means of which variation is continued. It takes what it finds already prepared and assists its transmission to succeeding generations. Selection, to employ the phraseology of a well-known naturalist, Prof. E. D. Cope,* "cannot be the cause of those conditions which are prior to selection"; in other words, selection cannot explain the origin of anything, and to this fact, even so strong an anti-Lamarckian as Prof. Lankester subscribes, for in his rather heated reply to Prof. Cope's article, he asks† "Who has ignored this? When and where?" If then it is conceded, even by this ardent follower of Weismann, that selection does not originate, or cannot cause variation, what becomes of their theory? We must look for some more potent factor to explain the origin and transmission of acquired characters, and this we believe we find in the influences exerted by isolation and environment.

Another fact requiring investigation, and its influence in the transmission of acquired characters, is the use or disuse of any particular organ. Prof. Romanes‡ explains the effect of this as follows: "If any structure which was originally built up by natural selection on account of its use, ceases any longer to be of so much use, in that degree will the prominence before set upon it by natural selection be withdrawn. And the consequences of this withdrawal of selection as regards that particular part, will be to allow the part in a corresponding measure to degenerate through successive generations." Weismann calls this principle

*Nature, XLI, 1889, p. 79.

†Ibid. p. 129.

‡Ibid. p. 437.

Panmixia, but Prof. Romanes terms it Cessation of Selection. The first-named author contends that this cessation of selection is capable of inducing degeneration down to the almost complete disappearance of a rudimentary organ, but Prof. Romanes argues that unless assisted by some other principle it can at most only reduce the degenerating organ to considerably above half or even one quarter its original size; because although no longer sustained by natural selection, it is by heredity, and as long as this force is unimpaired, the withdrawal of selection cannot reduce the organ much below the efficient level above which selection maintained it. But he farther argues that the force of heredity must fail, because a useless organ absorbs nutriment, occupies space, etc., and then natural selection not only ceases, but becomes reversed, and hastens the degeneration of the organ until a point of balance is reached, and the organ being no longer a source of detriment remains as a rudiment, and so it would remain forever if heredity were everlasting, which is not reasonable to suppose, and that the eventual disappearance of the organ would be caused by this failure of heredity. Prof. Weismann at first argued that the degeneration of an organ from disuse could be effected by panmixia alone, until it was reduced to five per cent of its original size, or in his words* "the complete disappearance of a rudimentary organ can only take place by the operation of natural selection; this principle will lead to its elimination, inasmuch as the disappearing structure takes the place and the nutriment of other useful and important organs;" not that the organ is transmitted from parent to offspring in a continued diminished state until it disappears, not from a failure of heredity itself, but by the influence of selection exerting a deteriorating effect. This he modifies, however, in his reply to Prof. Vine's criticism† when he says, "organs in disuse become rudimentary, not through the direct action of disuse, but because natural selection no longer sustains them." Therefore these disused organs which have become 'acquired characters,' transmitted from parent to offspring through undiminished conditions, disappear not through the failure of heredity but by selection withholding its sustaining power, or as Prof. Romanes has argued, acting in an opposite degree.

*Essays, 2d ed. p. 89.

†Nature, Oct. 24, 1889.

Now what is heredity, how did it originate, and how can it cause individual variability? An explanation cannot be found in the higher organisms, but must be sought for, according to Weismann, in unicellular organisms, or those in which no distinction exists between body and germ-cells; and which reproduced by fission, or division, when the two descendents of an individual are nothing more than the two halves of that individual. It is undisputed and acknowledged* by Weismann, that unicellular organisms are acted upon by external influences, and that these cause variations of size, color, form and number or arrangement of cilia, and these resulting characters are transmitted to the offspring, and he remarks "We are thus driven to the conclusion that the ultimate origin of hereditary individual differences lies in the direct action of external influences upon the organism," and that when individual difference had been attained by unicellular organism, "it necessarily passed over into the higher organisms when they first appeared." Does it not seem reasonable then to suppose that when these latter organisms received these inherited characters, they also obtained the power of transmitting direct adaptations derived from their environment? Regarding the evolution from cells of one kind (Protozoa) to cells of two or more kinds (Metazoa) coöperating in the same organism, Prof. Lloyd Morgan† argues that "Whenever and however this occurred the new phase of developmental reproduction must have had its origin. And if in cell-division there is any continuity of protoplasmic power, the faculty of producing diverse coöperating cells would be transmitted. On any view of the origin of the metazoa, this diverse or developmental reproduction is a new protoplasmic faculty; on any view it must have been transmitted, for otherwise the metazoa would have ceased to exist." But Weismann claims that in multicellular or higher organisms these variations could not originate and be transmitted, and illustrates this by citing* the improbability of a pianist, who by practice had developed the "muscles of his fingers so as to ensure the highest dexterity and power," being able to transmit this power to his offspring, because, according to his view, the effect would be entirely transient, as it would be unable to produce any

*Essays, 2d ed. pp. 285, 286.

†Anim. Life and Intell. p. 143.

change in the molecular structure of the germ-cells, and could not therefore produce any effect upon the offspring. This, however, does not seem to be a proper illustration of the subject, for the son of a pianist, even if capable, might not choose to become a pianist, and although the muscles his parent developed, might, if exercised, easily acquire an equal power to them, more easily probably than the offspring of a parent who had not so developed them, yet if disused they would remain in an only partially developed condition. Such may also be the answer to the similar illustration of Mr. Dyer,* of the blacksmith and his muscular arms. It does not follow that the son of a blacksmith must, or will, himself be a blacksmith; and until this acquired development has been observed in a line of blacksmiths descending from father to son for generations, it would be impossible to ascertain whether the abnormal muscular development could be transmitted or not. In this connection it may be stated that Mr. Arbuthnot Lane (as quoted by Lloyd Morgan)† has shown that certain occupations, such as shoe-making, coal-heaving, etc., produce recognizable effects upon the skeleton, the muscular system, and other parts of the organization. And he believes that such effects are inherited, being very much more marked in the third generation than they were in the first. And it might also be pointed out that the extreme development of the thigh muscles in the Ostrich is continued from parent to offspring, and although this is now an inherited character through long periods of time, it must have been at one stage of the bird's existence a character acquired from use, and its unusual development began when the wings became modified and its changed habits caused the individual to rely for defence and safety more upon its legs.

We may therefore say with Prof. Eimer that "every character which must have been formed through the activity of the organism, is an acquired character. All characters, therefore, which have been developed by exertion are acquired, and these characters are inherited from generation to generation. The same holds for all organs atrophied through disuse — the degree of atrophy is acquired and inherited. In the first class we see especially the

*Nature, XLI, 1890, p. 247.

†Anim. Life and Intell. p. 169.

‡Organic Evolution, p. 86.

action of direct adaptation, in the second the results of the cessation of this action. A third class of acquired characters is to be traced simply to the immediate action of the environment on the organism, and originally, at the commencement of their appearance, all characters must have belonged to this class."

Let us now consider other characters that are transmitted. Myopia is a deterioration of the powers of the eye, and this has become so prevalent in certain portions of Europe as to be almost a national characteristic. That its effects are and have been transmitted from parent to offspring is undeniable. Natural selection can have had nothing to do with it, otherwise this would be to assert that this principle, in this instance at least, had transmitted a character having an injurious effect, and thus enabling its possessor to be less fitted for the struggle for life, or exactly the opposite of the theory of the survival of the fittest. Weismann attempts* to meet the difficulty of this evident transmission of this acquired character by attributing it to an "accidental disposition on the part of the germ, instead of to the transmission of acquired short-sightedness," or to the "greater variability of the eye, which necessarily results from the cessation of the controlling influence of natural selection," or panmixia. Or, in other words, that some progenitor of these myopic-inflicted generations may have had a congenital disposition to myopia, and have developed weak sight from an original predisposition which he naturally transmitted, not as an acquired character. And again, eyesight in a European, unlike that of a savage, is no longer under the preserving influence of natural selection, and the European, therefore, to make up for this deficiency and render himself the equal of any, uses spectacles. On this explanation Prof. Osborn well remarks† that "the latter example shows how Weismann's followers are put on the defensive when they try to explain the introduction of a new character without the Lamarckian principle, and solely by ingenious application of the Darwinian principle." Another instance of transmission of acquired characters, though perhaps old and often referred to, is that of a puppy, the offspring of parents trained to hunt birds, which, though untrained itself and never having seen other individuals of its species at work in the fields, suddenly stops and, without

*Essays, 2d ed., pp. 90,91.

†Atlantic Monthly, 1891, p. 360.

knowing the effect of a shot, springs forward, barking, to seek for game when the gun is discharged. Weismann endeavors* to explain this by saying that the dog has not inherited from his forefathers a certain association of ideas,—shot and game,—but rather he has inherited a reflex mechanism which impels him to start forward on hearing a report, and that it is not the effects of training, but some predisposition on the part of the germ, which has been increased by artificial selection. But this reasoning, even if capable of proof, which of course it is not, would not explain the fact of a puppy suddenly coming to a stand and remaining motionless in an uncomfortable attitude in the same manner as was the habit of its parent, unless this character of the breed so displayed had been transmitted by its parent. The first pointer undoubtedly possessed the instinct, or inherited the habit of hunting. It is not to be imagined it also possessed the trait of stopping and remaining stationary when it had found the object it sought, for that would have enabled the game to escape, but this additional trait was added by man to utilize and make more efficient its other powers, and assist him in obtaining game, and this habit so acquired by the dog was transmitted to its offspring, and continued by succeeding generations. If this had not been so, each offspring of every parent would have been obliged to acquire the same habit in the same way independently. Prof. Eimer† cites instances of pointer puppies belonging to him, which had never been trained, and never had seen a Partridge, "pointing a covey perfectly correctly, standing motionless with head outstretched, fore paw lifted, and tail stiffly erected." These, he says, "are thorough-bred pointers which require no training at all, but have completely inherited the habits to which their ancestors were educated." He also cites an instance of a *Wildbodenhund*, a dog "used to drive game towards the sportsman by barking." It was about two weeks old when he obtained it, and as soon as it grew up, although it was never taken out shooting, began to drive game on its own account, and in spite of punishment, extended its operations every day. Another instance of acquired characters being transmitted is that of a pure-blooded female pointer or setter which had produced offspring by mating

*Essays, p. 94.

†Organic Evolution, pp. 168, 169.

with a dog of another breed. These puppies would be mongrels showing traits of both parents. Now if this female is again mated with a pure-blooded dog of its own species, the offspring will be pure, but occasionally in some of the litters, it may be years afterwards, there will appear in some of the offspring characters belonging to the breed to which the first dog belonged. These having been received by the female, were retained and transmitted to her offspring, though apparently they may have been dormant for considerable periods of time.

Birds acquire habits not possessed by their parents. I cite an instance. Currituck Sound, in North Carolina, where wild fowl are accustomed to pass the greater portion of the winter, is a great resort of sportsmen, who pursue the birds in every way to accomplish their destruction. This at length was carried to such a degree that the fowl had no place left for them to rest during the day. Some years ago the gunners were surprised to find that whenever the weather permitted, as soon as a gun was fired in the early morning, the birds would rise and betake themselves to the ocean, and remain congregated on the water, just beyond the line of the breakers, and would not return until night closed in. This custom was acquired by birds of succeeding years, until the habit has become apparently established. Now it may be said that this is not an *acquired* habit, but the result of example, the old birds leading the young to the sea. But this would be to assume that the majority of the birds which commenced this habit had survived and returned to this locality every winter. And even if the young, without at first comprehending the reason for so strange a proceeding, merely followed the old birds, is it reasonable to suppose they would remain in such an unusual locality throughout the day, deprived of their food, which could be obtained in profusion on the other side of the narrow beach? It must have been something more powerful than the mere example of the flight of the old birds to the ocean, witnessed by the young for the first time, which compelled them to remain. Can we not more reasonably presume that it was the knowledge acquired by the parents that this was a secure method to escape from a threatened danger, and transmitted to the young who assumed the habit as part of their nature?

Instances of transmission of acquired habits are found in the change of nesting among birds. Geese proverbially make their

nests upon the ground, but in certain localities arboreal nidification is adopted. This is witnessed in various parts of the Yellowstone, and upper Missouri regions, as related by Coues,* where the birds build in the heavy timber along the larger streams, and transport their young to the water in their bills, corresponding with the habits of the Wood Duck, some of the Mergansers and other Ducks. This character of change of habits is also exemplified in the Herring Gull (*L. a. smithsonianus*), caused mainly by persecution, and to escape from its enemy, man. Audubon† gives a striking instance of this. On arriving at White Head Island in the Bay of Fundy, he was surprised to see individuals of this species nesting in trees, and the owner of the island, a Mr. Frankland, informed him that this habit had been acquired *within his recollection.* When he first came to the island all the nests were placed on the moss in open ground, but as the eggs were collected for winter use, the old birds began to nest in trees in the thickest part of the woods, and their young followed this habit when their time of breeding arrived. Audubon also states that on neighboring islands to which fishermen and eggers have free access, this Gull breeds altogether on trees, and their original habits have been entirely given up. A remarkable effect of this transmission of an acquired character is that the young hatched in the trees do not leave the nest until they are able to fly, while those hatched in nests on the ground run about in less than a week and conceal themselves at the sight of man among the moss and plants. Some of the nests he saw in the trees were placed at a height of more than forty feet, those in the thickest part of the woods were about ten feet from the ground, and placed close to the stem, and were to be seen with difficulty. The species of the genus *Colaptes* build in holes in trees, either natural cavities, or enlarged to suit their needs. But *C. cafer* is known to breed in the banks of streams, where the absence of trees renders such a proceeding necessary, and like a Kingfisher, readily excavates a burrow. This fact has been observed by Mr. Henshaw‡ in New Mexico and Arizona, and is also mentioned by Dr. J. A. Allen§ as occurring along the Ogden and

*Birds of the North-west, 1874, p. 554.

†B. of Am. Vol. VII, p. 163.

‡Ornith. Wheeler Survey, p. 401.

§Bull. Mus. Comp. Zoöl. III, p. 169.

Weber Rivers in Utah. In the latter instance, it being September, the time for breeding had passed, but the birds were dwelling in the holes, were frequently seen sitting in them, and the author's observations led him to believe they had nested in the holes, there being no trees in the vicinity.

The evidence of variations produced by use and disuse of special organs also tends to confirm our views that acquired characters are transmitted. The modifications of the wing in various families of birds, when through disuse the power of flight has been lost, and this member has become either rudimentary, or else changed both in form and size so as to serve more like a fin, giving its possessor additional powers for the pursuit of its prey under water, are numerous; and to attribute these modifications to the principle of selection, or predisposition of the germ and to deny that use or disuse has produced hereditary effects, as Prof. Weismann asserts,* is to argue from a mere assumption that lacks evidence to establish even its probability.

Migration preserves a species true to its type, in that migratory birds keep together in flocks, and select localities in which to remain, having similar environments to those where they were reared. But if a species ceases to migrate for any cause and remains isolated in its habitat, then differentiation occurs, and the variations that appear are reproduced in their offspring. Thus it may not be supposed that the Great Auk was always incapable of flight, but that it migrated, even if only to a limited extent, while its wings were fully developed. This is a reasonable supposition, because all its relatives, the Divers and Auks, are birds of great wing-power and migrate at the present time. From some cause, unknown to us, but possibly from its ability to procure food throughout the year in the region it inhabited, it gradually ceased to migrate, and its wanderings becoming less and less, its wings were employed chiefly under water in pursuit of its natural food. The wings therefore being used in a different manner from that when the bird was flying, would be modified and reduced in size until they reached the form and dimensions most suited to assist the species in swimming beneath the surface, but which in their reduced condition rendered flight no longer possible. These modifications were transmitted to its offspring, rather, we would

*Essays, p. 92.

suppose, from the production of hereditary effects than to a predisposition of the germ, or selection, for there is no reason to suppose that this especial species of Auk, the largest and most powerful of the family, should have been in any way more predisposed to a degeneration of any of its organs than were any of its relatives, which have not degenerated, and which from their structure were no better fitted for the struggle for existence.

The Ostrich probably has descended from ancestors capable of flight, but they, we may suppose, did not possess so great a stature because a bird of that size would require such an expansion of wing that it hardly would be available to any creature other than a pelagic species. This ancestor was also a ground-feeding bird, and it is to be supposed that from physical changes occurring in its habitat it was obliged to rely more upon its legs than on its wings in order to procure a sufficiency of food, or escape from its enemies. Then the wings became reduced in size and the thighs correspondingly increased, and the legs not only were a means to enable the bird to travel with great swiftness, but also became a powerful weapon of offence or defence. Although the Ostrich is unable to fly at the present day, yet the manner in which it uses its wings when running, elevating them, and keeping them stationary as a bird does when sailing in the air, may be regarded as a trait derived from its flying ancestor, the only one appertaining to flight which its rudimentary wing permits it to retain.

I have by no means exhausted the evidence derived from birds, which strengthen us in the belief that acquired characters may be inherited; and I think the majority of ornithologists will agree with Prof. Lloyd Morgan* when he says: "I confess when I look round upon the varied habits of birds and mammals, when I see the Frigate Bird robbing the Fish Hawk of the prey that it has captured from the sea, the bald-headed chimpanzee adopting a diet of small birds, a *Semnopithecus* in the Mergui Archipelago eating crustacea and mollusca, and the Koypu, a rodent, living on shell fish; when I consider the divergence of habits in almost every group of organisms, the Ground Pigeons, Rock Pigeons and Wood Pigeons, seed-eating Pigeons and fruit-eating Pigeons; the carrion-eating, insect-eating, and fruit-eating Crows, the aquatic and terrestrial Kingfishers, some living on fish, some on

*Anim. Life and Intell. p. 446.

insects, some on reptiles; the divergent habits of the Ring Ouzel and the Water Ouzel; and the peculiar habits of blood sucking bats; — when I see these and a thousand other modifications and divergences of habit, I question whether the theory that they have all arisen through the elimination of those forms which failed to possess them may not be pushed too far; I am inclined to believe that the inheritance of acquired modifications has been a coöperating factor. It is not enough to say that these habits are all useful to their possessors. *It has to be shown that they are of elimination value* — that their possession or non-possession has made all the difference between survival and elimination."

Other branches of zoölogy also afford striking evidences of this transmission difficult to explain away. Moritz Wagner has shown that a species of *Saturnia*, transferred from Texas to Switzerland acquired new characters and transmitted them to its offspring of the first generation. A number of pupæ were brought over, and the moths developed out of the coccoons exactly resembled the Texan species. Their young were fed on leaves of *Juglans regia*, and the moths were different, both in form and color, and were considered by entomologists as a distinct species. The polymorphic snail *Helix nemoralis*, was introduced from Europe into Lexington, Virginia, a few years ago. Under its new conditions it varied to a greater extent than it had been known to do elsewhere, and one hundred and twenty-five varieties have been observed, of which no less than sixty-seven are new or unknown in Europe, its native country.*

The shrimp *Artemia salina* lives in brackish water, and the *A. milhausenii* in water much salter. By altering gradually the saltness of the water, either of them can be transformed intc the other in the course of a few generations, and the change of form is maintained, the altered conditions remaining the same.†

Vertebrate paleontology furnishes evidences that acquired characters are transmitted, and that the majority of these occur alone from use and disuse, and Weismann argues that these variations are quantitative, and are acted upon by natural selection. But in tooth evolution, as pointed out by Prof. Osborne,‡ there are ex-

*Cockerell, Nature, Feb. 27, 1890.

†Lloyd Morgan, after Schmankewitsch, Anim. Life and Intell. p. 164.

‡Am. Nat. 1891, p. 16.; ibid. Nature, XLI, 1890, p. 227.

amples that are qualitative, or "rise of structures that are essentially new, and not simple modifications of pre-existing forms."

One of them is the addition of new cusps, which do not rise at random points and disappear, but successive cusps are added to the simple conical crown at the point of the maximum wear. There are rare exceptions to this fact, however, which will require subsequent research to explain whether or not they are in conformity with the laws of individual adaptation. A very striking instance of the effects of use and disuse is cited also by Prof. Osborne* derived from the ancient pedigree of the American horse, where we are (to use the Professor's words) in before the birth, so to speak, and the modifications in the leg from the four-toed *Hyracotherium* to the eocene *Mesohippus* were caused, as proved by various investigators including himself, by the strain arising each time the foot was placed upon the ground producing infinitesimal alterations in all the bones of the leg, and "during the early geological periods these strains were constantly changing *pari passu*, with the gradual decrease of the lateral, and increase of the central digits." And in view of this evidence we may all say with the writer of the article from which I have quoted that "it is hard to believe with the new school, these invariable sequences of race adaptation on individual adaptation are not instances of cause and effect. If they are, they afford absolute proof of the transmission of acquired characters. If not, all our pains-taking researches and vast literature lead to no result."

I have thus as briefly as possible, though fully conscious of having occupied more time than I ought, brought this extremely important subject before you for your earnest consideration. It will be readily perceived that I have merely touched upon a few of the points that would naturally arise for discussion, in connection with the transmission of acquired characters but my object, in drawing your attention more particularly to this question, is to excite your interest, in the hope that by your own individual investigations and experiments you may be able to throw some light on so much that now is obscure and impossible of explanation. We none of us have the temerity, I trust, to say with a distinguished botanist† that "the questions at issue with regard to evolution are now thoroughly understood by biologists," but

*Atlantic Monthly, 1891, p. 362.

†Dyer, Nature, XLI, 1890, p. 315.

rather approach our task with a full appreciation of its enormous difficulties, and in the words of the Duke of Argyll* "conscious above all thing of the ignorance of man." The subject I have discussed offers a new field for ornithologists to explore, one of a higher plane, and permitting a wider vision than many of those they are accustomed to tread. I submit it to my younger colleagues, who have time and opportunities before them, as of infinitely more importance than the discovery and naming of new forms, which is by no means the beginning and end of ornithology, but rather, if I may so term it, the A B C of the science; and then by their contributions towards the elucidation of my theme, they will benefit not only those who are devoted to our own branch but also all scientific men throughout the world.

*Nature, XLI, 1890, p. 367.

FOURTH SUPPLEMENT TO THE AMERICAN ORNITHOLOGISTS' UNION CHECK-LIST OF NORTH AMERICAN BIRDS.

By order of the Council of the American Ornithologists. Union the Committee on Classification and Nomenclature of North American Birds has prepared the following report on the species, subspecies, and changes of nomenclature proposed during the year ending November, 1891, forming the Fourth Supplement to the American Ornithologists' Union Check-List.

The numbers at the left of the scientific names facilitate collation with the Check-List. The interpolated species and subspecies are numbered in accordance with the provisions made therefor in the code of Nomenclature (see page 14, last paragraph).

Committee { D. G. Elliot, *Chairman.*
J. A. Allen.
William Brewster.
Frank M. Chapman.
Charles B. Cory.
Elliott Coues.
H. W. Henshaw.
C. Hart Merriam.
Robert Ridgway. }

I. ADDITIONS.

310 *b*. **Meleagris gallopavo osceola** Scott.

Florida Wild Turkey.

Meleagris gallopavo osceola Scott, Auk, VII, Oct. 1890, 376.

[B 457 *part*, C 379*a part*, R 470*a part*, C 554 *part*.]

Hab. Southern Florida.

374 *a*. **Megascops flammeolus idahoensis** Merriam.

Dwarf Screech Owl.

Megascops flammeolus idahoensis Merriam, North Am. Fauna, No. 5, July, 1891, 96, pl. i.

[B—, C—, R—, C—.]

Hab. Central Idaho.

462 *a*. **Contopus richardsonii peninsulæ** BREWST.

Large-billed Wood Pewee.

Contopus richardsonii peninsulæ BREWST. Auk, VIII, April, 1891, 144.

[B—, C—, R—, C—.]

HAB. Sierra da la Laguna, Lower California.

529 *a*. **Spinus tristis pallidus** MEARNS.

Western Goldfinch.

Spinus tristis pallidus MEARNS, Auk, VII, July, 1890, 244.

[B 313 *part*, C 149 *part*, R 181 *part*, C 213 *part*.]

HAB. Arizona.

547 *a*. **Ammodramus henslowii occidentalis** BREWST.

Western Henslow's Sparrow.

Ammodramus henslowii occidentalis BREWST. Auk, VIII, April, 1891, 145.

[B 339 *part*, C 163 *part*, R 199 *part*, C 326 *part*.]

HAB. Dakota.

567 *c*. **Junco hyemalis thurberi** ANTHONY.

Thurber's Junco.

Junco hyemalis thurberi ANTHONY, Zoe, I, Oct. 1890, 238.

[B 352 *part*, C 175 *part*, R 218 *part*, C 263 *part*.]

HAB. California.

593 *c*. **Cardinalis cardinalis canicaudus** CHAPMAN.

Gray-tailed Cardinal.

Cardinalis cardinalis canicaudus CHAPMAN, Bull. Am. Mus. Nat. Hist., III, Aug. 1891, 324.

[B 390 *part*, C 203 *part*, R 242 *part*, C 299 *part*.]

HAB. Southwestern Texas, south into northeastern Mexico.

629 *d*. **Vireo solitarius lucasanus** BREWST.

St. Lucas Solitary Vireo.

Vireo solitarius lucasanus BREWST., Auk, VIII, April, 1891, 147.

[B—, C—, R—, C—.]

HAB. Lower California.

682.1. **Geothlypis poliocephala palpebralis** (RIDGW.).
Mirador Yellowthroat.

Geothlypis palpebralis RIDGW. Man N. Am. Bds. 1887, 526.
Geothlypis poliocephala palpebralis ALLEN, Auk, VIII, July, 1891, 316.

[B—, C—, R—, C—.]

HAB. Eastern Mexico, north to Brownsville, Texas. (*Cf.* ALLEN, Auk, VIII, 1891, 316.)

II. CHANGES OF NOMENCLATURE.

567.1. **Junco carolinensis** BREWST. This becomes
567 *e*. **Junco hyemalis carolinensis** BREWST. (*Cf.* DWIGHT, Auk, VIII, July, 1891, 290, and BREWSTER, Auk, III, Jan. 1886, 108.)

III. FORMS CONSIDERED AS NOT ENTITLED TO RECOGNITION.

Ictinia plumbea (VIEILL.).—The record of the occurrence of this species in Florida proves to have been founded on a misidentification of an immature example of *Ictinia mississippiensis*. (*Cf.* CAHOON, Orn. and Oöl. XV, March, 1890, 35, and CHAPMAN, *ibid.* XVI, March, 1891, 44.)

Ammodramus caudacutus becki RIDGW. Proc. U. S. Nat. Mus. XIV, 1891, 483.

The type and single known specimen proves to be not distinguishable from *A. c. nelsoni*.

Pipilo maculatus magnirostris BREWST., Auk, VIII, April, 1891, 146.

Rejected on the ground of the slight and inconstant nature of the differences supposed to distinguish it from *P. m. megalonyx*.

Sitta carolinensis lagunæ BREWST. Auk, VIII, April, 1891, 149.

Not satisfactorily distinguishable from *S. c. aculeata*, the alleged characters proving slight and inconstant.

Turdus sequoiensis BELDING, Proc. Cala. Acad. Sci. 2d ser. II. Oct. 1889, 79.

Considered as not distinguishable from *T. aonalaschkæ auduboni*.

IV. PROPOSED CHANGES IN NOMENCLATURE REJECTED.

Hirundo LINN. vs. *Chelidon* FORST. (*Cf.* REICHENOW, J. f. O. 1889, 187.)

An examination of SHÄFFER's work (Elementa Ornithologica) as regards its scope, character, and purpose, including his treatment of *Hirundo*, fails to substantiate the claim that *H. rustica* must be considered the type of *Hirundo*, and that consequently *Chelidon* becomes a synonym of *Hirundo*. Therefore the former action of this Committee on this case is now reaffirmed.

V. ACTION DEFERRED FROM LACK OF MATERIAL.

Final action on the following was deferred, owing to the absence of sufficient material to enable the Committee to arrive a satisfactory decisions.

Megascops asio aikeni BREWST. Auk, VIII, April, 1891, 139.

Megascops asio macfarlanei BREWST. Auk, VIII, April, 1891, 140.

Megascops asio saturatus BREWST. Auk, VIII, April, 1891, 141.

Vireo vicinior californicus STEPHENS, Auk, VII, April, 1890, 159.

The following proposed changes of nomenclature were laid on the table, to be considered at some subsequent meeting of the Committee, in connection with other cases requiring revision.

216 *a*. *Porzana jamaicensis coturniculus* BAIRD vs. *Porzana coturniculus* RIDGW. (*Cf.* RIDGWAY, Pr. U. S. Nat. Mus. XIII, 1890, 309.

431.1 *Trochilus floresii* GOULD vs. *T. rubromitratus* RIDGW. Auk, VIII, Jan. 1891, 114.

The question of the generic or subgeneric rank of the genus *Ardetta* GRAY.

ERRATA.—In the Third Supplement to the Check-List (Auk, VIII, Jan. 1891) numbers 582*h* and 582*i* (p. 86) should stand respectively as 581*h*, and 581*i*.